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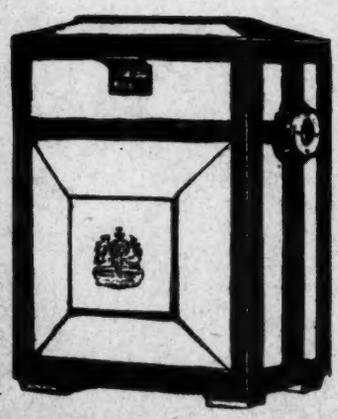

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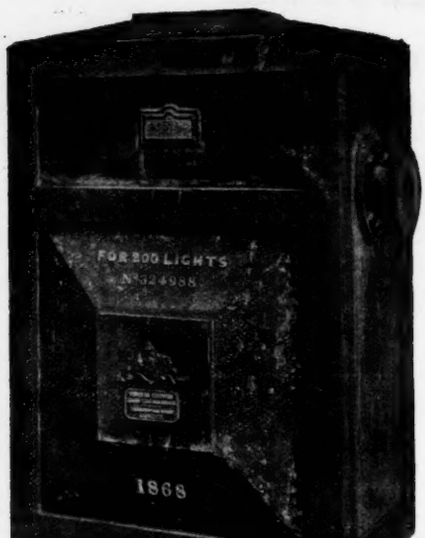

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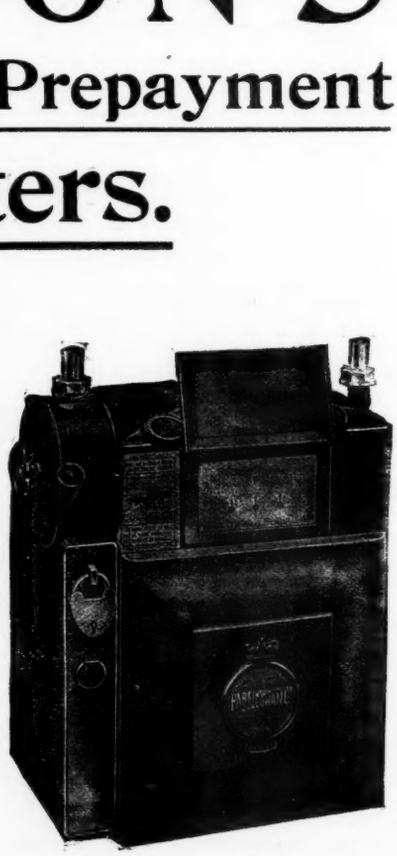

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIV., No. 2902.] TUESDAY, DECEMBER 24, 1918. [70TH YEAR.

EDITORIAL NOTES.

Christmas Time.

To meet the convenience of Post Office distribution, the "JOURNAL" has been printed earlier than usual this week, and should be delivered to readers on Christmas Eve. This gives us the opportunity, through the noble deeds of the Allied Armies and Navies during over four-and-a-quarter years of terrible warfare, to greet readers under infinitely happier circumstances at this season. But it cannot be on this occasion in the old circumstances. We can at this Christmas time (as we have been doing since Nov. 11) all sincerely rejoice over the victorious conclusion of the war, as we all had faith must be the case, on the side of Right, Justice, and Honour. There will be throughout the land many happy hearts this week through the ending of the war with alive and well beloved ones who have had part in the terrific fighting. There will be many who are mourning severe losses. The sympathy of those who have been spared like grief will go out to those who mourn, and who will feel their sorrow the more keenly because it is Christmas, and because the old times can never return to many of them with the same fullness of joy. It cannot, therefore, be exactly the same Christmas as in the years of former peace. Time alone can assuage sorrow, if not altogether heal deeply-cut wounds, the pain of which can only be mitigated by the knowledge that they have been occasioned by the pink of our manhood fighting in a good cause. However, the joy of victory is ours; and this is sufficient ground upon which to hope for our readers all the happiness this Christmastide that circumstances and personal feelings will permit. On Christmas Day, too, we shall not forget our heroes who are still abroad helping to look after the allied interests, and to see that victory has its just consummation. Among the men still representing us and our cause are many drawn from the gas industry; and they will be glad to learn that at this season the thoughts of fellow-workers at home are turned to them. We trust that ere long they will be welcomed back to take once more their places in the old surroundings. Speaking of the industry, there will be another cause for thankfulness this Christmas time. Victory has made the first breaks in the clouds of difficulty and anxiety that have with gathering weight and blackness been hanging over all our industrial operations. There is confidence that these breaks will gradually expand until there is final dispersion, though the industry will then be operating under new conditions. The realization of this state may be slow, but it will be sure, if the industry prudently utilizes its opportunities. Among the men of the industry and all related to them there will be gladness that this Christmas finds them with relief at hand, and with good promise of a returning prosperity. Our wish then is that as much happiness as possible will reign this Christmas time, and that it will mark the dawn of a larger life and prosperity for the industry, and for all who serve in it in any place or way.

Relaxation of Gas Standards for a Further Period.

IT is an opportune letter which Mr. Garnham Roper, on behalf of the Board of Trade, has addressed to the Municipal Corporations Association and the Urban District Councils Association, regarding the suspension of action in relation to infractions of gas standards within a reasonable limit defined by calorific value—at any rate, until the end of June next It is only a suggestion, not a mandate; but coming from the Board of Trade, as it does, together with the circumstances in which it is made, will, we think, ensure for the suggestion the respect it deserves. The letter is opportune because there have already been signs of the breaking out of the old hostility towards gas, immediately on optional washing of gas for benzol precipitately taking the place of more or less compulsory washing; while, as a matter of fact, where calorific standards obtain, the difficulty of maintaining them is due less to benzol recovery than to the coal situation, and to the desire of the Coal Controller that as much water gas as possible shall be made, so as to assist him in a period in which, the portents declare, there are going to be considerable difficulties in regard to coal deliveries. His desire that there shall be conservation of coal stocks to the fullest possible extent by the use of water gas (for which purpose the price of oil has been brought down, though still too high for heavy use from the gas maker's point of view) will be particularly marked by those responsible for the maintenance of gas supplies. This being the position, and this the reason given for a further period of relaxation of gas standards, it would, of course, be quite possible for the friendly suggestion of the Board to local authorities to be converted, if there be the need (which we do not anticipate), into something that would be more pronounced and effective.

The Board are quite satisfied as to the impracticability of requiring gas undertakings to revert immediately to their pre-war standards; but, at the same time, they are careful to protect themselves from any idea that they have, pending the investigation and report of the Board of Fuel Research, come to any determination as to what should be the future normal quality and composition of town's gas. But as an emergency measure only, and to meet the abnormal situation that still exists, and is likely to exist for some months ahead, the Board's suggestion is that proceedings should not be taken "so long as the calorific power does not fall below "450 B.Th.U., and so long as the proportion of inert con- "stituents in the gas is not excessive." This, of course, applies to all gas undertakings, whether still under the futile illuminating power standard or a calorific one. The 10 p.ct. abatement on the 500 B.Th.U. standard is not by any means extravagant in view of the express necessity for making it. But still it is a working relief which will allow gas undertakings to do better for their consumers than they would otherwise be able to do in the circumstances of the times, while enabling those with water-gas plants, or that are able to steam their retort charges, to make their coal supplies go further without sending to the consumers an inordinate percentage of incombustibles. Regarding these undesirables, it will be noticed that in Mr. Garnham Roper's letter there are two references to "quality" and "composition" of gas, as well as the qualification to concession "so long as the "proportion of inert constituents in the gas is not excessive." This is a timely indication that the Board of Trade still have the matter of inerts and composition in the frontground of their consideration of gas supply. While strongly opposed to the presence of avoidable inerts in gas, as we do not believe in selling anything to gas consumers that has no worth to them, and which has (for some purposes) a depreciating effect upon efficiency, we cannot see the direct value of the qualification "so long as the proportion of inert constituents "in the gas is not excessive." There is no statutory definition as to what is an "excessive proportion" of inert constituents, especially under the varying circumstances of coal and plant conditions, which latter are to-day far from satisfactory in many cases owing to the repair and labour restrictions imposed by the war. Then who among the local authorities is to determine what is an "excessive propor- "tion" of inerts?

However, in view of their general position, gas undertakings will be grateful for the greater security which the

Board of Trade letter has given them; and they will look to the Board to use their position to protect them, under the abnormal conditions, against vexatious proceedings. At the same time, the appeal may be made to gas undertakings to pay particular attention to the question of avoidable inert constituents. It is clear from Mr. Garnham Roper's letter and from indications elsewhere that this is a matter that is only in abeyance; and it will be a good thing for gas undertakings when the question of gas composition comes up for determination (as it will do) later on, if they are able to show as clean a slate as possible in the matter of incombustibles during the period in which they may, owing to the prevailing conditions, supply a lower calorific power gas. The next few months should give the industry an opportunity of proving several things under working conditions; and they should therefore make the best use of the time in preparation for the day when they will urge a case, on public grounds, for greater freedom.

"Consistent with the National Interest."

THE communication from the Board of Trade noticed in the preceding article will, we learn, put an end for the time being to any definite action by the London County Council, the Public Control Committee of which, as was stated last week, were considering the question, now that hostilities have ceased, of the return of the Metropolitan Gas Companies, so far as is "consistent with the national interest," to the supply of gas in accordance with pre-war standards. The words "consistent with the national interest" are very striking. They invite one to ponder a bit, and to wonder what is in the minds of the Public Control Committee. If they really consider the matter in the light of the national interest, they will find that "the national interest" is synonymous with "the gas consumers' interest," and then we may hope—perhaps it will prove a forlorn one—that the London County Council will set about changing their ways from the obstructive and unjust to assisting the gas companies to serve simultaneously the national and the gas consumers' interests. The work of a local authority, we admit, should be protective of public interests. But it should also be carried on in a broad and enlightened spirit; and if new knowledge shows that change will be productive of good, then the correct attitude should be to help to procure the change, and not to obstruct it. In other words, the policy of a local authority should be to work in harmony with private enterprise with the view to ensuring the largest measure of public good, which has not been the attitude hitherto. Now, however, we are standing in the cross-roads running from the old ways into new. There are new-born ideals before us, and fresh aspirations. The almost universal feeling is to use the knowledge which war time has yielded, and to make the utmost of our resources, with the view to creating a larger prosperity and a greater measure of utility. Is this the feeling of the Public Control Committee of the London County Council in relation to the question of restoring the standards of gas supply to their former nominal degrees?

Let us and the Committee consider points not of an abstract order, but concrete in character. During the war we have forgotten all about illuminating power standards; and the Government itself, for the purpose of meeting the requirements of the war, put the gas industry on a calorific power basis. There is the point as to benzol extraction. The Committee acknowledge that the washing of gas by tar makes a difference to the calorific value of only 2 p.ct., and oil washing of only 5 p.ct. On a 500 B.Th.U. gas, the 5 p.ct. merely means a loss of 25 B.Th.U., which, under the conditions of gas use, is an imperceptible difference—in fact, there is much practical experience during the war which shows that reasonably lower calorific power gas of good combustible characteristics is as useful as, if not more so than, the higher calorific value gas to the consumers employing present-day gas appliances, taking into account also the reduced proportion of air required to produce complete combustion, which has a beneficial effect on the temperature of the flame and the consequent service of the flame. This is a point worth looking into in the consumers' interest, and therefore in the national interest.

But dealing with benzol extraction, it is seen how little the washing of gas for this purpose affects its calorific value. And we are considering the matter in relation to the national interest. The national interest is pleading for more motor spirit, and benzol is likewise required for dye and other purposes. On the showing of the Public Control Committee, this valuable benzol has hitherto been wasted through not considering the national interest. It has fifteen to twenty times more power when used as a liquid than when burned as a vapour for heating. There we have another point inviting consideration. It was also shown in the article published by us last week by Mr. S. E. Whitehead, B.Sc., that benzol is 15 to 20 p.ct. more powerful than petrol for motor purposes. Then is it not in the national interest that this benzol should be brought to better account than by burning it? Is not its recovery consistent with the national interest? If not, then we must admit that our reasoning faculties are very much at fault. We might go so far as to say that the London County Council would be rendering a national service if they got Parliament to prohibit the continued wasteful burning of the benzol vapours in gas, so long as there is a market and use for benzol. We might almost go so far as to say that the Council should ensure that the companies make the utmost out of their secondary products opportunities, in order that gas may be sold at as low a figure as possible. From the point of view of the consumers, the costs of coal, oil, materials of all kinds, and labour are going to be much heavier than before the war. Sulphate of ammonia is menaced with stronger competition; and prices will not be maintained. It is therefore to the interests of the consumers that benzol should be recovered, and the revenue from it go towards meeting the increased manufacturing costs of gas. This is an economic question; and it deserves the consideration of any body having charge of the public interests. The sliding-scale, and the competition of electricity and coal, will ensure the best possible use being made of any revenue derived from this source, which revenue, of course, will be subject to fluctuating markets.

A great deal has been said during the war as to the conservation of our coal resources. This is a question of supreme interest to the nation. One way to conserve coal is to obtain and put to use as much of its thermal energy as possible, and as large a proportion of its other constituents as is practicable. The present level of calorific value per cubic foot of gas deprives suppliers of the power to put in gaseous form a larger number of B.Th.U. per ton of coal carbonized into their distributing mains, to be delivered to the consumers by underground pipes, and always on tap by them. This limitation on calorific value is repugnant not only to the national interest, but to local interests and those of the individual consumer. If a larger number of B.Th.U. can be put into the mains, and the gas is of good combustible quality, it means that a smaller amount of coal is used for a given sale of B.Th.U. in gaseous form than under the old order of things. In the national interest, the Council might also consider whether it is wise to allow the electricity industry to consume bituminous coal for the production of heating energy. When it is considered that from about 3 lbs. up to more than 17 lbs. of coal are used in electricity stations in the country per 3420 B.Th.U. delivered to the consumers (with no secondary products from the use of the coal), it cannot be said that this is "consistent with the "national interest," having regard to what is done by gas-works, in which an equivalent heat energy is produced by the carbonization of 1¼ lbs. of coal, leaving half the quantity in the form of coke still available as fuel, with a surplus even then remaining as tar oils and spirit.

We are pleased indeed that the Public Control Committee made use of the words "consistent with the national inte-"rest." There is much they have to learn as to what is "consistent with the national interest." With that interest, the old policy of the Council has been deplorably inconsistent, and that is a lesson of the modern work of the gas industry, which is shaping its course to larger public service. We invite the London County Council to show its statesmanship by assisting gas undertakings to gain their objective. The phrase made use of by the Council's own Committee, and quoted so frequently in this article, supplies them with a channel by which they can pass from an erroneous policy to one which will be of very considerable public benefit.

That there is great need for a better understanding of these matters by men in public position was well illustrated by the remarks of the Chairman of the Public Control Committee (Mr. A. L. Leon), when presenting the report to the Council, which we reproduced last week [p. 622], on the subject of calorific power and inerts. These remarks show Mr. Leon to be hopelessly at sea on the question, and to have small appreciation of it in regard to those larger aspects

to which attention is drawn in the foregoing part of this article. We hope he will accept the invitation to examine the whole subject during the next few months so as to ascertain whether outside old statutory rule there is not value for the public, and therefore opportunity for a revision of policy. Take, for example, one of the first points in his remarks. "As members know," he said, "the very bad heating power "of the gas is due to the Government asking the gas "companies during the war to provide them with all "the benzol and toluol they could make." "Bad heating "power," be it noted. Yet his own Committee's report shows that the calorific value of the gas is only depreciated by 2 p.ct. by tar-washing for benzol, and by 5 p.ct. by oil-washing. He also referred to the "very poor gas" the Companies had supplied. Yet his own Committee's report admits that, at the time this year when oil-washing was proceeding North of the Thames and the Coal Controller was urging the Companies to conserve their supplies of coal as much as possible, and use their water-gas plants, the average calorific power (the worst mentioned in the report) was 470 B.Th.U.—only 6 p.ct. below the 500 B.Th.U. standard allowed under the Standard of Calorific Power Act, and better by 20 B.Th.U. than the 450 B.Th.U. permitted under the Order issued to protect the gas undertakings that were supplying the country with high explosives. How, in face of the figures published upon the authority of his own Committee, Mr. Leon can justify his statements, we do not know. It is perfectly clear that he is drawing largely on his imagination, and not on actual calorimetric results, which disprove his assertions. When, too, Mr. Leon compares the gas supply North and South of the Thames, he should be fair, and point out that the Companies North of the Thames have been helping in the war in the supply of explosives to a larger extent than the South Metropolitan Company by washing by oil and not by tar. In addition, the Companies on the North side of the Thames have been better helping (per unit of gas output) the Coal Controller and London itself in the matter of coal, owing to the fact that the South Metropolitan Company have had to use all coal for gas making through the total absence of water-gas plant on their works. Mr. Leon awards more credit to the southern Company than to the northern ones on account of the maintenance of the calorific power of the gas. He does not stop to inquire how this was accomplished; and, consequently, he has no word of praise over the credit due to the northern Companies for the line of policy that they adopted, at the instance of the Government, in the national interests. One in the public position of Mr. Leon should be just, should give credit where it is due for real unselfish work which has been of vast value to the nation and therefore to London, and should not from his position help to create a wrong public impression.

Dr. Perkin on Continuous Vertical Liquid Fuel Results.

TOWARDS the end of the paper which Dr. F. Mollwo Perkin read last Tuesday, on the "Production of Oil from Mineral "Sources," before the Institution of Petroleum Technologists, he made some statements and gave figures bearing upon the utilization of continuous vertical retorts, with steaming, for obtaining liquid fuel. The criticism which he makes is absolutely unfair; and, as a statement of fact, it is not altogether true. But so far as his figures are correct, and not subject to qualification, they are due to the fact that between plans and armistice the time was too short to get the plants available into full working order. But the figures are illustrative of something more than that. They and the quick coming of the armistice are evidence of the disaster the Government would have met with had they proceeded with those big low-temperature carbonization schemes which the enthusiasts were pressing them to take up a few short months ago. These large schemes would never have been finished in time to have contributed a gallon of oil to the needs of the country before hostilities ceased. They would still have been in the constructional stage. Labour, materials, and money that were being more profitably utilized elsewhere would, so far as the war was concerned, have been wasted upon them; and there would not any way have been the cannel or other high-class coals available for them. Even when eventually finished, who knows that, on the large scale and under every-day working conditions, they would have been a success? Neither Dr. Perkin nor any other chemist, however eminent, could have guaranteed they would have been so. Less than a week ago it was confessed at the meeting of the British Coalite Company that the low-temperature plant at Barnsley is now being used only experimentally with the view to further improvement. Lord Crewe's Committee were abundantly justified in strongly advising the Government, in the circumstances of the times, not to speculate in this direction. Directly labour and materials are at liberty, the low-temperature people are free to go on speculating on their own account, and establish their new industry just as they think best, without Government interference. Their great chagrin is that they did not, while the war was on, get the Government into the swim, and secure from them large financial support. It was fortunate the Government were saved from this. No one denies that the chemical and physical characteristics and the volumes of products from low-temperature operation are different from those of high-temperature carbonization, and have a distinct value; but this carries no certainty of an equivalent commercial success.

A different story would have been told by the continuous verticals had time been on their side. But fortunately the arrival of peace was against them. The mistake Dr. Perkin has made is to utilize figures based on nascent emergency working, and his assertions are wrong at that. Take in the first instance his statement that the average amount of distillate obtained was 30 gallons per ton of material carbonized, which made the cost of the oil 1s. per gallon, *excluding* labour and operating charges. The fact is that at Nottingham the average yield of oil per ton was 38 gallons; and the total cost, *including* labour, operating charges, and making up any gas deficiency at times that the plant was not working at full capacity, was, for the period from April to September, as follows: April, 17·33d. per gallon (starting-up of the plant); May, 7·94d.; June, 5·57d.; July, 5·59d.; August, 7·77d. (there was then unfortunately a breakdown of the cannel-breaker); and September, 5·86d. These are authoritative figures which put a different complexion on the position; and, in face of them, what justification has Dr. Perkin to offer for the publicity he gave to the erroneous information in his paper? Moreover, he says nothing about the quantity of gas put into the holders, and the excellent yield of sulphate of ammonia. Then, again, he states that the cost of the "conversion" of the "retorts" was £100,000; while the fact is the total cost of any so-called "conver-"sion" of plants and of completing one plant was £50,500. By far the largest item of this sum (about £12,000) was for the completion of the Bradford plant. This plant was unfinished for ordinary gas making; and the expenditure was for mains, condensers, &c., which were required before the plant could be used for any purpose, and should not therefore be charged as a "conversion" cost. A good proportion of the balance of the money was spent on extra condensers, scrubbing plant, and other things. For example, at some works superheaters for the steam were installed. It is, therefore, quite untrue to say the money—a sum of £100,000!—was spent on the "retorts." Further, Dr. Perkin says the coke was practically valueless. Where cannel is used, the coke is admittedly not the same as that from ordinary gas coals. At Nottingham, there was at the outset a difficulty in disposing of the coke; but recently the demand has exceeded the supply. At the other works, the coke has sold well at the same price as ordinary gas coke. Dr. Perkin has evidently been wandering without a satisfactory guide.

Industry and the Continued Control of Materials.

It has been the duty of British industries to strain every nerve, and to bring to bear the full force of their resources, to accomplish victory. That they have done this well has been freely acknowledged. But having done so much, it is now the duty of the Government to help industry to the utmost to restore their operations. The feeling is running high throughout the industries that the Government are not doing this. The view may be wrong. But still it is the desire of the industries that restrictions and control should be removed as quickly as possible; and there is a well-sustained outcry against the slow movement of the Government, though abundant work is waiting to be taken up, of which work the country must have a good share in order to begin the recovery of the national fortunes. The Government defend their methods on the ground that there shall not be armies of unemployed in our streets. This is an excellent attitude, if the methods were not impeding the rate of provision of

employment. One method of avoiding unemployment is by hastening the removal of control from materials. And the sooner this is done, the sooner will be banished the ardent dislike that has been engendered against control.

Is Three per Cent. Good Enough?

A National War Bond advertisement appeared in the Public Press last week with the above question as the heading. The advertisement proceeds: "You would say at once that an investment yielding only 3 p.c. was not good enough for your money. And you would be right." We strongly recommend the question and the expression of opinion, made public on behalf of the Treasury, to the wonderful Committee who last session considered the question of the financial relief of gas companies, as well as to those members of Parliament who opposed not only the 1¾ or 2 p.ct. that the Committee considered sufficient to maintain the financial stability of gas undertakings, but the granting of any relief at all. According to the action of the Committee and these short-sighted legislators, the credit of gas undertakings is pre-eminently superior to that of the Government. We decline to believe it, big as is our faith in the gas industry. The advertisement tells us that National War Bonds yield (including the premium on redemption) from 5¼ to 5⅜ p.ct. Notwithstanding, Parliament has only allowed sliding-scale gas undertakings with 3½ and 4 p.ct. stocks £2 12s. 6d. and 3 p.ct.! But the War Bond advertisement frankly declares that 3 p.ct. is not good enough for invested money. We agree.

Gas and Lifting the Blockade on Electricity Connections.

The electrical people during the latter part of the war have regarded themselves as hard done by through two restrictions that were made upon new business. First they were denied the right to make connections where gas was used or where a supply of gas was laid on, owing to the work the gas industry had to perform in providing materials for explosives manufacture as well as liquid fuel for the Navy, and, in the second place, owing to the coal situation, there came subsequently the Electricity (Restriction of New Supply) Order. The electricity industry rejoices that the blockade has been removed in regard to gas users; and their pleasure is doubtless by no means of a light order over the fact that certain bye-products of the gas industry have not now upon them their war-time value, though still of national importance for motor use and the dye and colour preparations required by imposing industries. The good news in regard to the first matter has been conveyed to the electricity industry by Mr. H. Faraday Proctor, the Hon. Secretary of the Incorporated Municipal Electrical Association. The Council of this body requested Mr. Proctor to write to Mr. A. B. Gridley, the Director of Power Supply of the Ministry of Munitions, asking him "whether he would secure freedom of choice in the use of gas or electricity to consumers or prospective consumers in preference to the existing arrangement which favours the utilization of gas due to war requirements." Mr. Gridley did his best; he could do no more. In his reply, he was directed to say: "The fact that a gas supply may be available on the premises need no longer be a reason for declining to entertain applications for supplies of current for domestic purposes. In modifying to this extent the restrictions which have hitherto held, I would remind you that, until the coal situation has materially improved, the Electricity (Restriction of New Supply) Order must unfortunately remain in operation."

The Difficulties of Coal Control.

The return of miners from the front is not having any immediate effect upon the output of coal. It could hardly be expected that the men would proceed at once underground; and altogether things seem to have gone from bad to worse. But the worst that will happen is the rather prolonged holiday the miners will take this week. After then the men from the front may be expected to make their presence felt; otherwise they might just as well be with the army of occupation in Germany as at home. The latest information from the Coal Controller as to coal output shows that the total raised during the first forty-four weeks of this year was 194,321,100 tons, which falls short of the output in the corresponding period of 1917 by 17,679,600 tons, or 8·3 p.ct. Since the end of March, too, the stocks of coal at the mines and in trucks have been reduced to the extent of upwards of 1⅓ million tons approximately. The acute shortage is expected by the Coal Controller to last for several weeks from the present time; and therefore he cannot hold out any hope of relief from coal rationing this winter. It is likely, however, that the first effects of a more abundant coal supply will be to permit more gas and electricity to be used. This will be wise as far as gas is concerned, because deliveries of coal to gas-works involve less labour than deliveries of coal to householders, and the coal is in gas-works put to a use that is highly productive of thermal energy and other things.

Coalite Still Experimenting.

The shareholders of the British Coalite Company, Limited, are so accustomed to optimistic speeches and promises of good things which come to naught, that they will not be shocked at the statement in the Directors' report, presented at the meeting of the Company last Wednesday, that it is hoped to improve considerably on what has already been achieved by the Barnsley plant, which, to this end, is being very largely used for experimental purposes. So another year has passed; and the Company are still experimenting, as they have been for a dozen years or so. When on earth is experimental work going to cease, and practical, commercial, dividend-earning operations to begin? But great things are still vocally projected. "As the Barnsley plant is the first of its kind to be erected anywhere, it will no doubt be the forerunner of cognate plants all over the country—and, indeed, all over the world." This is the view of the Chairman (Mr. W. J. Fisher); and something of the same kind has been the view of succeeding Chairmen since Coalite first made its vain-glorious début in the City.

Something Wrong, but Still Boastful.

We are not told precisely in the Chairman's speech at the meeting what is the trouble at Barnsley; but it is said that there is something wrong with the quantity of tar obtained. Mr. Fisher is "informed" that this is solely due to the badness of "certain material" supplied. What does he mean by "certain material?" There are two things that, given good designed plant, affect the quantity of tar—coal and temperature. If the "certain material" is coal, then why not say so? But these confessions regarding the Barnsley plant indicate that it was a good thing the Government did not spend a heap of money and waste good and badly wanted materials in putting down an extensive plant on the Coalite model for war purposes. However, the Chairman has told the shareholders the plain truth, that Coalite is not the only pebble on the low-temperature beach. But he tried to make the truth more palatable with the words, "though he thought he might say with absolute confidence that not one of those experimenting in this direction had come within measurable distance of what had been accomplished at Barnsley." There are other low-temperature men who are of opinion that they could give the Barnsley plant several points, and beat it in the final results—product, fuel, and labour. The snatching at every straw to compose something for consumption by the shareholders, is further shown by the Chairman's observation, "that it had been reported to him that a Government expert who visited the Barnsley plant some time ago declared quite candidly that it was half-a-century ahead of anything of the kind in existence." We should like to know who that Government expert is before placing much weight on such a vague assertion. The other processes must be fearfully bad if the Barnsley plant (with which there is still experimenting) is half-a-century ahead of them. We have seen low-temperature plants; and we are not prepared to swallow even the *ipse dixit* of a Government "expert."

Benzol, Naphtha, and Tar Orders Suspended.—The Minister of Munitions has suspended until further notice the Benzol and Naphtha Order, 1917, which controlled crude benzol, crude naphtha, and light oils; (2) the Naphtha Order, 1917, which controlled crude solvent naphtha, solvent naphtha, and heavy naphtha; and (3) the Tar (Coal and Water Gas) Order, 1917, which controlled coal tar and water-gas tar.

Effect of Exposure on Coke.—It is remarked by the "Ironmonger" that it is a mistake to suppose that no loss results from the practice of leaving coke exposed to the weather. Experiments made recently with quite dry coke and a sample artificially watered up to 16 p.ct. of its weight, show that a given quantity in a given time furnished 228 B.Th.U. wet and 365 B.Th.U. dry—approximately 39 p.ct. advantage in favour of dry coke. The proportion of moisture in coke may vary from 2 to 20 p.ct.; and in the condition indicated in the experiment, the heat in the grate or boiler was partly used to dry-out the water, which escaped as moisture into the flues, carrying certain heat with it, and thereby reducing efficiency.

MR. MILNE WATSON APPOINTED GOVERNOR OF THE GAS LIGHT AND COKE COMPANY.

Mr. JOHN MILES has retired from the post of Governor of the Gas Light and Coke Company, but will retain his directorship; and Mr. D. MILNE WATSON, the Managing Director, has been elected Governor in his place, but will continue to act as Managing Director of the Company as well. There is pleasure on our part in making the latter portion of this announcement; and we cordially congratulate Mr. Milne Watson upon his succession to the headship of the Company. It is but the consummation of outside anticipation and hope. Since the death of Sir Corbet Woodall, the advancement of Mr. Milne Watson in the administrative work of the Company has been rapid; but many years' intimate experience of the inner operations of the huge concern, as well as admirable personal characteristics and a broad outlook, have given to him an incomparable eligibility for the supreme place. The wish of a large number of friends will be that in a position of such heavy responsibility, the new Governor will meet with an abundant success. We are glad that, though advancing in years, Mr. Miles is retaining a seat on the Board. His long years' experience and his accumulated knowledge as a member will continue an asset while health permits.

PERSONAL.

Mr. CLIFFORD C. PATERSON is terminating his appointment at the National Physical Laboratory, Teddington, and is joining the General Electric Company, Ltd., as Director of Research Laboratories, as from Jan. 1.

Mr. C. H. WORDINGHAM, C.B.E., who since 1903 has been head of the Electrical Department of the Admiralty, and so responsible for the design, and supervision of the construction and completion for service, of the electrical equipment of H.M. ships, as well as for advising on all important questions of electric lighting and power in connection with dockyards and other naval shore establishments, has resigned his appointment as Director of Electrical Engineering, in order to return to consulting practice. His address after Jan. 1 will be No. 7, Victoria Street, Westminster, S.W. Mr. Wordingham has been retained by the Admiralty to continue acting in an advisory capacity.

Mr. WILLIAM H. WISE, whose appointment as Engineer and Manager of the Droitwich Corporation Gas-Works was recorded in last week's issue, was educated at the Dudley Grammar School, afterwards entering the offices of the Sedgley Urban District Council Gas Department under his father, Mr. W. H. H. Wise, who is Accountant and Secretary there. Subsequently he became articled to Mr. William Prince, the Engineer and Manager of the Tipton Urban District Council Gas-Works; and at the expiration of his articles, he was appointed Assistant to Mr. Prince. He holds first-class honours in the City and Guilds of London Institute examinations in "Gas Engineering" and "Gas Supply," and also first-class certificates in "Chemistry" and "Electricity."

Prof. PERCY FRANKLAND, Ph.D., LL.D., F.R.S., Sc.D., has intimated his intention of resigning at the end of the current term the Mason Chair of Chemistry in the University of Birmingham. He is Dean of Faculty of Science, and has occupied the Chair of Chemistry in the Birmingham University since its inception. Previously he was Professor in the Mason College—having, in fact filled the Chair of Chemistry in Birmingham for a quarter-of-a-century. He has been President of the Chemical Society, of the Institute of Chemistry, and of the Chemical Section of the British Association, and has twice served on the Council of the Royal Society. During the war period, he has filled the office of Deputy-Inspector of High Explosives for the Birmingham area, and, besides conducting numerous experiments for the Ministry of Munitions, has organized and directed the testing of tar for toluene for the same district.

Temporary Increase of Charges Act.—Orders have been made by the Local Government Board for the Coalville Urban District Council raising the maximum price from 4s. 8d. to 5s. 6d. per 1000 c.ft.; for the Hebden Bridge and Mytholmroyd Gas Board, putting the maximum up from 4s. 6d. to 6s. 9d.; and for the Thornton Urban District Council, increasing the price allowable from 4s. 6d. to 5s. 6d. per 1000 c.ft. An application for an Order has been received by them from the Bourne (Lincolnshire) Urban District Council. The Board of Trade have recently made Orders in favour of the Hexham Gas Company, the Deal and Walmer Gas and Electricity Company, the Brighton and Hove General Gas Company, the Dundalk Gas Company, the Maidstone Gas Company, the West Gloucestershire Water Company, the Barnard Castle Gas Company, the Brockenhurst Gas Company, the Rochester, Chatham, and Gillingham Gas Company, the South Metropolitan Gas Company, the Southend Water-Works Company, the Ryde Gaslight Company, the Ventnor Gas and Water Company, and the Southampton Gaslight and Coke Company. Applications for Orders have also been made to the Board by the Falmouth Gas Company and the Dowlais Gas Company.

NATIONAL GAS COUNCIL—IMPORTANT NOTICE.

THE Council have now circulated the revised Constitution and Rules; and every gas undertaking should have received forms to be filled up applying for membership, and also for membership of the separate Committee of Employers. If any undertaking has not received the rules and forms, immediate application should be made to the temporary offices of the Council, No. 39, Victoria Street, Westminster, S.W.

GAS STANDARDS AND CURRENT CONDITIONS.

A Suggestion to Local Authorities from the Board of Trade.

SOME doubt has been felt in the gas industry as to whether the notice issued by the Explosives Supply Department of the Ministry of Munitions giving gas undertakings full liberty to continue, discontinue, or modify the washing of gas for the extraction of benzol automatically forces a return to pre-war standards of calorific or illuminating power. As, however, has been pointed out on more than one occasion in our editorial columns, the Order which was issued allowing undertakings to supply coal gas of 500 B.Th.U before washing or mixed gases of 450 B.Th.U. after washing has never been withdrawn. It will now be seen by the following letter—addressed by Mr. Garnham Roper to the Association of Municipal Corporations, the Urban District Councils' Association, and the London County Council—that the Board of Trade are suggesting, in view of coal and oil conditions, that local authorities shall take no proceedings for the next few months "so long as the calorific power does not fall below 450 B.Th.U., and so long as the proportion of inert constituents in the gas is not excessive."

Public Utilities and Harbours Department,
Board of Trade,
7, Whitehall Gardens,
Dec. 16, 1918.

Sir,—I am directed by the Board of Trade to state, for the information of the local authorities represented by your Association, that they have had under consideration the question of the position as regards the supply of gas by the various companies and public authorities to whom the regulations imposed by the Ministry of Munitions have been applicable, when those regulations are withdrawn.

Under the regulations in question, full compliance with the statutory standard of calorific or illuminating power of the gas has not been generally practicable; and the removal of the regulations would have the effect of placing the undertakers under the necessity of immediately supplying gas of the statutory standard.

It has, however, been urged upon the Board of Trade by the Coal Controller that, in view of the stringency of the coal position, which is likely to continue for some time, no change in the existing methods of manufacturing gas should be allowed which would have the effect of increasing the consumption of coal or diminishing the extent to which water-gas plant is made use of for supplementing the output of coal-gas plant.

Moreover, the amount of oil available for enriching purposes is limited, and the price of oil is so high that any increase in the proportion now used would undoubtedly necessitate a further increase in the price at which gas can be supplied.

In view of the fact that the Fuel Research Board, at the request of the Board of Trade, have been for some time investigating the question of what is the most suitable quality and composition of gas, having regard to the purposes for which gas is now used, but are not yet in a position to report the result of their investigations, the Board of Trade do not feel themselves justified in placing an obligation upon the undertakers to reduce the quality of the gas below the statutory standard by any prescribed amount. On the other hand, the considerations referred to above make it impracticable to require them immediately to revert to the pre-war standards; and they desire to suggest for the consideration of the local authorities responsible for the testing of gas throughout the country that the general interest will be best served if they will refrain for the present from taking proceedings against any of the gas undertakings in respect of deficiencies of calorific power, so long as the calorific power does not fall below 450 B.Th.U., and so long as the proportion of inert constituents in the gas is not excessive.

The Board of Trade, so far as they can foresee at present, do not contemplate that this relaxation of statutory requirements should continue beyond the end of June next; and they will be glad to learn that in the circumstances the local authorities represented by your Association are prepared to adopt the course suggested above.

I am to add that the Board of Trade are especially anxious that it should be generally understood that they are not in this letter committing themselves to any view as to what should be normally the standard of quality or composition of gas, and that the present proposal is merely put forward as an emergency measure designed to meet the abnormal situation which exists at the moment and is likely to continue during the next few months.—I am, &c.,

(Signed) GARNHAM ROPER.

GAS ACTS FOR 1918.

SECOND ARTICLE.

WE conclude to-day our review of the changes that have been made during the progress of the gas measures promoted last session.

In the Maidenhead Gas Company's Act, the clauses proposing relief in respect of the standard price have been expunged. The other clauses are identical with the Bill as reviewed on Jan. 15. It is observed, however, that the purchase section of the model residuals clauses has been omitted. As to the additional capital, the amount is now £20,000, instead of £30,000. The provisions of section 13 of the Act of 1900, in so far as they limit the rate of dividend on the preference capital, are repealed; and any preference stock hereafter created may be stock bearing a dividend not exceeding 6 p.ct. per annum. Among the clauses inserted for the protection of the Maidenhead Corporation, the following are of especial interest.

> The Company shall not carry out any process for the recovery or manufacture of sulphuric acid, or any other manufacture of a deleterious character on any part of the lands described in the first schedule to this Act: Provided that the powers by this Act conferred upon the Company to work-up and convert thereon residual products arising from the manufacture of gas by the Company shall be deemed to allow the Company to (*a*) treat ammoniacal liquor, (*b*) extract benzol from the gas, and (*c*) dehydrate tar with the object of making the same suitable for use in connection with the repair and maintenance of roads and other purposes for which dehydrated tar may be suitable or conveniently used, and to manufacture such other materials from residual products as may be agreed upon between the Corporation and the Company, or, failing such agreement, allowed by an arbitrator appointed by the Board of Trade on the application of the Corporation or the Company.
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> The Company shall not under the provisions of the section of this Act of which the marginal note is "Charge for Gas to Premises having a Supply of Electricity or Gas," charge for any year in respect of any premises in the borough of Maidenhead any greater sum than the sum by which the ordinary charge for gas supplied by the Company to such premises in that year falls short of the sum of £4, or the sum of £4 in respect of any year in which no supply of gas is taken from the Company for such premises.

The Cookham Rural District Council have adopted the same protective provisions as the Maidenhead Corporation; and the first one as to the working-up of residual products has also been granted to the Thames Conservancy. The Eton Rural District Council likewise have protective powers. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The Newcastle-on-Tyne and the Plymouth and Stonehouse Companies' Bills were among those withdrawn, owing to the general legislation affecting financial relief.

The Pontypool Gas and Water Company's Act [the provisions of the Bill were noticed in the "JOURNAL" for Jan. 15] has been shorn of the proposal to purchase, under agreement, the property of the local Electric Light and Power Company. It contains a large number of water clauses. Coming to the gas clauses, it is noticed that the calorific standard of 475 B.Th.U. asked for has been altered to 500 B.Th.U. While the general pressure of gas is to be 15-10ths, the Great Western Railway Company have secured the right to 20-10ths. Additional land powers have been obtained. We miss the proposals for the conversion of the stock; and as to the additional capital, the £30,000 sought has been cut down to £15,000, with one-third borrowing powers. Authorization as to the issue of redeemable preference and debenture stock has been granted. The other clauses are of ordinary character. [*Parliamentary Agents: Messrs. Rees and Freres.*]

The Portsea Island Gas Company's Act is but the shadow of the original Bill, chiefly owing to the legislative change as to financial relief. The dividend of 5 p.ct. allowed on preference capital by the Act of 1901 has been altered to 7 p.ct. Borrowing powers have been raised to one-third part of the paid-up capital; and the issue of redeemable preference and debenture stock is authorized. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Rhymney and Aber Valleys and the Richmond Bills, being financial relief ones, were withdrawn.

In the Rotherham Corporation Gas Act, the powers sought are allowed with respect to the purchase of crude gas, and of steam, waste heat, or electricity, as well as for the sale or lease by the Corporation of part of their own electricity plant. The other provisions referring to these matters are as noted when reviewing the Bill on Jan. 22 last; but, in addition, it is observed that the Corporation are not to supply gas or crude gas within the supply limits of the Dinnington and District Gas Company, Ltd., or in certain parishes within the supply area of the Beighton and District Gas Company, Ltd. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The South Metropolitan Gas Company's Act is considerably shorter than the original Bill. By it the Company are empowered to raise additional capital not exceeding £637,500 by the creation of ordinary and preference stock, with one-third borrowing powers. Further debenture stock authorization is also conferred. Sanction is given to the raising of £500,000 by the creation and issue of redeemable preference and debenture stock. The remaining clauses chiefly refer to the issue or reissue of the stocks allowed under the Act. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The progress of the South Shields Gas Company's Bill was suspended owing to the prorogation of Parliament; and we will notice its provisions when the Royal Assent has been given.

The South Suburban Bill has been curtailed by the deletion of the clauses referring to financial relief. The Bill was noticed at some length in the "JOURNAL" for Jan. 29; and comments on its features were made by Mr. Charles Hunt at the meeting of the Company, reported in our issue of Aug. 13. The acquisition of the Dartford Gas Company's undertaking has been ratified. The electrical clauses have disappeared, and so has the proposed clause to confer power for the supply of gas for mechanically propelled vehicles. The power gas provision now stands as follows:

> The expression power gas used in the Act of 1912 shall, in construing that Act, mean gas supplied for any industrial or manufacturing purpose to any premises except a building used for domestic purposes; and notwithstanding the provisions of section 64 of the Act of 1912, power gas may be used for illuminating by means of incandescent burners any premises to which such power gas is supplied in accordance in all other respects with the provisions of the Act of 1912 and of this Act.
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> Nothing in the Act of 1912 or in this Act shall relieve the South Suburban Company from any obligation with respect to the supply of gas of the quality, purity, and pressure prescribed by the Acts relating to that Company to which they would have been subject if the provisions contained in the Act of 1912 and this Act relating to power gas had not been enacted.

The intention to apply the calorific standard to parts of the area of supply still under the domination of an illuminating power standard was abandoned, owing to the opposition of the authorities concerned. Other powers refer to annual meetings, and the issue of preference debenture and redeemable stocks. Their nature was indicated on Jan. 29 last, when reviewing the Bill. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Southampton, the Swansea, the Tynemouth, the Yeadon and Guiseley, and the York Bills were withdrawn.

Therefore the only other Act remaining is that of the Wandsworth, Wimbledon, and Epsom District Gas Company. But we do not see anything in it which varies the notice given of its clauses on Feb. 5 last; and to that notice readers may be referred, together with the comments of Mr. H. E. Jones on the Bill, at the last meeting of the proprietors, as reported on Sept. 3. [*Parliamentary Agents: Messrs. Lees & Co.*]

ELECTRICITY SUPPLY MEMORANDA.

THE technical managers of the electricity supply industry seem to take it for granted that electricity for power purposes is going to advance without interruption until it occupies the whole of the field. For manufacturers there are, as for Harrods, Whiteleys, and Barkers, often considerations other than power that determine the question of home or outside produced energy. It has been shown by the "Electrical Times" that, at the great trading establishments mentioned, electricity is used not only for power but for lighting and vehicular purposes; and the steam-boilers on the premises are required not only for providing steam for generating electricity, but for hot-water supply and steam heating. The same in industries. Some visionaries in the electrical world have considered that the Government will, in the interests of the electricity industry, compel manufacturers needing power to take current from the outside distributing mains, albeit that they themselves may be able to produce cheaper internally owing to the circumstances of requirement for heat, hot water, lighting, power, and so forth. Prof. Charnock, at a recent meeting of the Bradford Engineering Society, pointed out that in many industries heat is equally as important as power; and, even if power was taken from the national supply, manufacturers would still have to provide their own heat, and for this purpose it was unlikely that the steam-boiler would be superseded for years to come. The Professor thought it a serious omission that this point had not received attention in the report of the Electric Sub-Committee of the Coal Conservation Committee of the Ministry of Reconstruction nor in that of the Board of Trade Committee on Electric Power Supply. There is a point here in favour of gas suppliers being permitted —as Parliament is authorizing them to do when asked—to supply in industrial centres power gas of a non-illuminating nature, which will provide heat, power, and (with incandescent burners) light. There is a good all-round value to a manufacturer in such an agent on tap. No boiler settings, chimney shafts, and so forth. There were a good many points omitted from the two reports, and much said for which the only foundation is conjecture. Prof. Charnock mentioned another point. It was, he said, quite conceivable that future improvements might render obsolete the present methods of producing power by steam, in which case the super-power stations of to-day might be out of date to-morrow. Neither the Government nor the electricity industry can say they were not well warned, if they decide to proceed with the wonderful scheme which will have a mighty capital absorbing power, and it proves to be an unsound financial venture.

Heat and Power in Industry.

An Acknowledged Limitation.

There are people who think that it is contemplated to put a network of cables over the land, irrespective of whether parts are profitable or not. Mr. C. H. Merz, it will be recollected, was a member of both the Departmental Committees on electricity supply; and therefore a statement made by Sir John Snell, at a recent Local Government Board inquiry at Lincoln, is notable and interesting as bearing upon the profit productiveness of an indiscriminate transmission of electricity. The Lincoln Corporation are proposing to acquire a private generating plant, extend and adopt it for supplying generally power and lighting for industrial establishments, which are contemplating very considerable extensions of activities. The scheme, it was stated, has already the approval of the Electric Power Supply Committee as well as the Munition Works Board. Who authorized the Electric Power Supply Committee to approve of any local scheme—Parliament, the Board of Trade, or Mr. Merz? The statement of Sir John Snell was that, in conjunction with Mr. Merz, he has recently completed investigations into the South Yorkshire area, including the North Lincolnshire mines; and they have come to the conclusion that, unless there is a big industrial development between the situations of the generating stations on the River Trent and Rotherham and Sheffield, it will not be commercially possible to transmit energy a distance of thirty miles. Lincoln being thirty miles from any likely source of supply, the only alternative is for it to develop its own supply. Thus in the enormous tracts of the country where there are no or only sparsely placed industries, Sir John Snell and Mr. Merz give it as their opinion that it "will not be economically possible to transmit energy a distance of thirty miles." The "national" scheme is finding limitations. At first one might have imagined there were none; and politicians, novelists, and eminent gentlemen who work in the realms of science far removed from sordid commercial considerations, do not appear to know of any.

The I.M.E.A. on the Electric Power Scheme.

The President of the Board of Trade (Sir Albert Stanley) must by this time, in connection with the national electricity supply scheme, have found that, in the multitude of counsellors, there is confusion. He is appealed to and exhorted from one side and another; but never by any possible chance do appeals and exhortations agree the one with the other, nor is there any complete endorsement of the report of the Electric Power Supply Committee's proposals. Ever since the report appeared, there has been an almost continuous wave of criticism from municipal sources; the municipalities on the North-East Coast being of the latest. Now the Municipal Electrical Association has spoken. In the main the communication which they have addressed to the President agrees with the principles laid down in the report of his Committee, but exception is taken to certain of the details. We undertake to say if the administrators of the concerns that are members of the Association were canvassed for their criticisms on the report of the Association, there would be a beautiful tale of dissent in several particulars. There is one thing in which the Association concurs with prior municipal pronouncement; and it is that the proposed District Boards should wholly consist of representatives of local authorities and large consumers, to the exclusion of companies generating and distributing electricity. Private enterprise in the generation of electricity is to be absolutely destroyed; and in future there is to be a closed door to any aspirations in this direction. This is the plain reading of the proposal. As to the Electricity Commissioners, a point is made with which we entirely coincide, if the scheme matures. It is that it appears by the report to be proposed that three of the Commissioners shall give whole-time service, and receive not less than £3000 a year each; while the other two may be remunerated some other way, and be allowed to engage in other work. If this interpretation is correct, the Association protest against it, and urge that all the Commissioners should give whole-time service, and have no other duties. We may assume that, if allowed to take other work, this would be of an electrical character; and it is easy to conceive that the position of Commissioner might be of considerable professional benefit. The Association admit that, in suitable circumstances, economy is possible from large generating units; but, unless the area is suitable, capital and operating expenses incidental to a long transmission line may counterbalance the advantage derivable from the concentration of large plants. Attention is drawn by the report to the great amount of work already done in several parts of the country in the delimitation of suitable areas. But the Association agree with the transfer to the District Boards of all generating stations and main distribution lines. To allow any undertaking to retain the ownership of a power station within any given district while the remaining power stations are transferred to the Board would introduce serious complications. The Association name several points on which they are in agreement with the report. But they are of opinion that the terms on which transfers of stations should be made to the District Boards are inequitable and inadequate. They have also an eye to the compensation of officials. They urge the appointment at once of the Electricity Commissioners, and quite agree that, in view of the enhanced cost of materials, assistance, financial and otherwise, should be conceded to the industry by the Government. This is what most electrical men would like; but they do not say why preference should be given to the electricity industry over another industry which is in competition with it. Why should favour be extended to the electricity industry which is a distinct disadvantage to another statutory industry? Echo answers, "Why?"

Reminiscences.

After Sir Rider Haggard, Sir Oliver Lodge. He has been speaking about the promised electrical regeneration. What he says causes "Meteor" of the "Electrical Times" to become reminiscent. He refers to some "ten or twenty" years ago when the electrical papers were fighting a lonely battle to throw off the stranglehold of gas and its vested interests; and he writes:

> We seem to remember, by the way, that in those necessitous days there were even eminent members of our own scientific institutions who told us that gas lighting must be allowed its place in the scheme of things. Even gas itself admits that this place has been forfeited. We had scientific authorities—not Sir Oliver Lodge—who warned the public of the "whip lash" effect of metal filaments; and these sayings were joyously pounced upon by our ruthless competitors. How times have changed! To-day the good wine hardly needs any bush, but gets it. In days of old, we could get nobody to write about us in the common or garden press, though we had plenty of candid friends to tell us home truths, and keep us severely in our places. The electrical press was then the only antidote.

A little later in the same issue of the "Electrical Times," there is a paragraph on "Wind Power for the Generation of Electricity." The above quotation suggests that there is a superfluity of wind power in the office of our contemporary. Gas does not by any means admit that its place in the scheme of things as a lighting agent has been forfeited. The output of the gas industry during lighting hours is normally—despite the economy of incandescent lighting—as great as, and greater than, it was before 1882. It still holds the palm for economy, quality of light, and trustworthiness. And "Meteor" knows this, of course; but he must try to blow bubbles.

Growth of Business Under Exceptional Conditions.

The "Electrical Review" has published an editorial article which it has headed "Electricity Supply Progress." It thinks there are few spheres in which more wonderful progress has been made than in that of public electricity supply. It makes some remarks which are intended to lead readers to suppose it has had in its possession some cryptic information as to progress while the war was on. In fact, it has "scrupulously avoided giving any clue to our enemies which might assist them in identifying the centres where their aircraft could wreak destruction most effectively." This is extremely considerate. We have not the slightest doubt that our enemies were well acquainted with the areas which were most prolific in munition production; and therefore they might conclude that in these areas such undertakings as gas and electricity were being put to a severe test in supplying the requirements of the munition factories. Where, then, the secret? But while the "Review" has so consistently exercised scrupulous care, it has allowed a correspondent in the same issue to put into the heads of any nation who henceforth desires to take the *rôle* of enemy to this country a means of doing irretrievable mischief. He writes: "The sixteen (more or less) super-power stations which we are to gratefully accept as the cure of our present wasteful methods, will necessarily be huge, prominent, and conspicuous. The next time an enemy wants revenge, he will bomb these places to scrap heaps the day before he declares war." We hope the day will be far distant before war is again declared. So we will let that pass to see what it is that the "Review" has to say concerning electricity progress. Curiosity is whetted by the remark: "Now, while we must still exercise discretion, in some respects our hands are practically free." But our contemporary does not make any particularly good use of the freedom of its hands; and we are much disappointed. The information given is nothing more than a digest of previously published intelligence. We are told again of those 76 undertakings the plant of which was increased, or in course of being increased, from 851,756 KW. to 1,821,281 KW.—and in italics, the words are put "more than doubled," which anyone could ascertain who is capable of multiplying by two. Further, the output of energy was increased in those undertakings from nearly 1500 million units in 1914 to more than 2500 million units in 1917—an increase of 70 p.ct. in three years. Jubilantly our contemporary asks, Is not this a magnificent record? But the figures refer to only 76 stations, while there were a few hundred that were unable to increase their plant at all, and a good many of them would have had no occasion to do so, even if they had had the chance. The 76 were exceptionally favoured concerns in exceptionally favoured industrial areas, where munition work was in plethoric state. This does not denote general electric progress. It denotes an exceptional increase due to exceptional causes. It must be remembered that the number of electricity undertakings that have lost business during the war is not by any means a negligible one.

Control of Tar Oils.—The Mineral Oil Production Department of the Ministry of Munitions state that the total quantity of creosote fuel oil taken by the Admiralty from December, 1916, was 284,000 tons, of which about 179,000 tons were taken this year. Of oil for gas washing, 40,000 tons per annum have been licensed; and 35,000 tons per annum of tar oils have been used for Diesel engines.

TABLES OF CHEMICAL AND PHYSICAL CONSTANTS.

THERE have been published a series of useful "Tables of Chemical and Physical Constants" of special interest to the light naphtha section of the coal-tar and coke-oven industries, by Mr. Percy E. Spielmann, Ph.D. (Bâle), B.Sc.(London), F.I.C., A.R.C.Sc. (Head of the Analytical Laboratory of the Department of Explosives Supply, Ministry of Munitions of War), including weight gallonage conversion tables and dip-gallonage tables for travelling tank-wagons, calculated by Mr. Edward G. Wheeler, B.Sc.(London), F.I.C. (of the same Laboratory). The phenomenal activity which conditions of war have aroused in the coal tar industry having centred to a great extent in the light naphtha section, information has been collected, and new tables have been prepared, in order that works and factories should be put in possession of matter that is diffused throughout various books, or not published at all. The present compilation is in two parts. The first is concerned with chemical and physical properties of substances occurring in the light naphtha fractions, accompanied by tables of use in a chemical laboratory. Many of the physical properties have been re-determined, and almost all the numerical tables have been re-calculated; the latter having been checked by Mr. F. Butler Jones, B.A.(Cantab.), A.I.C. The second part consists of some new tables connecting depth of liquid in a travelling tank-wagon with its volume (constituting particular cases of a very comprehensive graph which will be completed in due course), and also a table to convert tons to gallons according to the specific gravity of the liquid.

The book has just been published by His Majesty's Stationery Office—price 4s. 6d. net.

WANTED—A GAS ASSOCIATION CLEARING HOUSE.

By NORTON H. HUMPHRYS.

A FEW days ago I received a circular from the Railway Clearing House in London. The subject thus notified is irrelevant; but the attention of those interested in sending circular letters or notices to managers of gas-works may be directed to the fact that it comprised on one sheet and by one delivery a communication from twenty-nine distinct companies. This may be contrasted with the experiences at gas offices during the last four years, which have included the receipt of duplicated notices from Government departments, gas associations (using the word in its widest sense), and manufacturers—not unfrequently up to a dozen copies by a dozen deliveries, that differ in nothing more than the concluding signature. Leaving the general phase of the subject and coming to the particular, we reach the main object now in view, which has been to some degree anticipated by the last sentence in Rule XIV. of the Constitution of the new National Gas Council, which authorizes the receipt of subscriptions in excess of those due to the Council, and the handing of the excess to any of the "associated bodies," at the request of the sender.

In the following remarks, the advantages of a gas association clearing house are considered in connection with one department only, though much might be added as to its utilization in other directions. At present, there are eight different associations to which gas undertakings are, or ought to be, subscribing, exclusive of one or two proposals that have not arrived at maturity. This means eight separate office equipments, clerks, sets of books, and forms. It means eight secretaries, who are not able to devote the whole of the time at their disposal to the advancement of the special subjects of which a special knowledge and experience have been the chief consideration when the selection was made, because practically they also have to act as clerk and collector, and are largely occupied with office matters which could be efficiently attended to by an ordinary clerk.

Municipal authorities, and firms running several departments serving one set of customers, have long since consolidated the receipt and collection of all dues in one office under one control with one collector in each district; and they find that the advantages thus secured are by no means limited to economy in their establishment expenses. An important point is that many people prefer to pay promptly at the office; leaving a much smaller proportion to be actually collected. And the associations supported by gas undertakings might consider the advantages of a similar financial combine, for the collection of the several subscriptions on a simple and comprehensive plan.

One result would be a large saving in stamps and stationery; and, by bringing all subscriptions into line as due on one convenient date, collection would be effected more promptly, and with less work in the way of second or third applications. Under present methods, only a small proportion pay before the first application, and the third or even the fourth is not always superfluous. Much of this is due to mere oversight, the liability to which would be greatly reduced under a system of one payment in place of eight. Take, as an illustration, the collection of any one contribution. The procedure will include application, stamps (correspondence, cheque, and receipt), clerks' time at both ends, addressing, posting, and filing communications, making up cash received, and paying to bank. All this averages quite 1s. per unit. Multiply this by eight, and by the average number of subscriptions to any one society. The total might be reduced to a fourth by the plan above outlined. All gas undertakings do not support the whole eight; but a large proportion are on the lists of not less than four. The expenses mentioned are as much for a subscription of 10s. as for £10; the only difference is 10 p.ct. on the receipts in the first case, and ½ p.ct. in the second.

The chief defect of the piecemeal system is the lack of interest and direct personal contact between the association and the directors who authorize the payment. For nearly half-a-century all efforts in the way of associated endeavour for the advancement and consolidation of the gas industry have been starved through lack of appreciation of the need, and of the definite results that can be obtained. The complaint that the average director does not take a broad view of the possibilities in a collective rather than an individual sense has been so common in presidential addresses, editorial comment, &c., that it is quite hackneyed. But such references usually come to an end at a point where they might with advantage be "continued in our next." It is all very well to give explanations, of which the sterilizing influence of minimum dividends, official testing, and absence of competition are favourites, These, together with the fetish of cheapness, have eclipsed any consideration as to the real requirements of the consumers. Any complaint from a customer to the effect that the quality supplied is not quite what he requires is silenced by a quotation from the official report, apart from the merits concerned, which in conjunction with cheap coal, cheap labour, cheap gas, and cheap gas-fittings, is assumed to fill the bill; and this view is by no means confined to the board room. It is remarkable that, without exception, these conditions are things out of court at present.

Instead of dwelling on the possible failings of the average gas director, who is by no means wholly to blame, one may more advantageously examine the methods that for some time have been moving in the direction of a better understanding. As a rule, he is not selected as possessing the qualifications that influence a similar decision in connection with other commercial concerns, such as special training or qualification, or extensive influence in the direction of new business. In many country districts, there is little choice. Possibly he has never been inside a gas-works, knows nothing about other gas undertakings apart from the information gained at that curious function known as the annual meeting of shareholders (which in some instances would be more correctly described as the annual absence), is not personally enthusiastic about the advantages of gas as applied in the home or in the factory, and has never influenced new business in his life. Contrast this with the policy adopted by one of our competitors. With few exceptions, however, he is a smart man of business, not opposed to enterprise, or to the necessary expenditure, if satisfied that it will tend to the ultimate benefit of the company. One reason why he may hold narrow views respecting his responsibilities is because they have not been put plainly and comprehensively before him. In early days there was no competition worth the name; and even at the present time the gas industry seems to be regarded in some quarters as a sort of unregulated monopoly. Competition has gently shaken up the dry bones; but nothing has been so effective as the removal of the testing-room handicap, restrictions in quality and price of coal, cost and scarcity of labour, and other war conditions. In these circumstances, the education of the average director, commenced some time ago, should be energetically followed up.

I have had some experience in bringing the needs for associated effort before the "board"—sometimes successfully and sometimes otherwise. A half-hearted request at the end of a long sitting when everyone is getting fagged does not attract sympathy, and may rouse opposition. A guinea or so may be granted without any attention to the merits of the case. The average director knows something about commercial advertising, and the futility of frail and timorous effort. A trifling sum is a deterrent rather than otherwise, on the principle that if a thing is worth doing at all it is worth doing well. Applications for a substantial amount for a definite object—such as a National Gas Exhibition—have without exception been well received; and with the majority, one application from a combined authority for (say) £20, efficiently presented, would receive better attention than ten separate applications for £2 each.

Many of the smaller items do not come before the board at all, but are paid by the manager out of petty cash—perhaps because the directors do not care to be troubled with detail, or are not likely to be interested. In either case, the effect is to put associated effort into a back seat. Many directors have very hazy ideas on the subject. One requisition for a good round sum would attract an amount of attention to each unit that it does not receive as a separate number. But the requisition should be introduced by definite home truths, rather than generalities. Take the "Life of Meters" report for example. A discursive lecture of an hour's delivery would not be out of place at a gas-fitters' improvement class; but the following would be more suitable for the board room:

The investigations conducted by the Research Committee show that, by a simple operation carried out in our own shops, the working life of a gas-meter can be prolonged, the proportion of slows and stops reduced, and a substantial reduction effected in the gas lost or unaccounted for. Our loss on this item (at present £1000 per annum) can thus be brought down perhaps one-half. The report also contains

some suggestions as to purification that will tend to the extension of the average working life.

On such lines I submit that a Gas Association Clearing House might materially assist and strengthen the growth of associated effort, besides economizing establishment costs, and expedite the arrival of the Institution building, the experimental gas-works, and other desirable projects that are at present in abeyance through lack of funds.

That an opportune time has been attained, is largely due to the excellent articles for all sellers and users of gas, contained in the "One Thousand and One Uses of Gas" issued by the British Commercial Gas Association. We are all interested in holding and extending the present position, which will not take care of itself in future if it has to some extent done so in the past. It is wise to see that suitable numbers are distributed among the directorate; and if Mrs. Director reads and talks about them at her afternoon teas, no harm will be done. For we can say, with Mr. Lloyd George, "The ladies are our best friends."

WAR TIME LIGHTING TOPICS.

Preceding the technical papers read at the meeting of the Illuminating Engineering Society last Thursday—Mr. A. P. Trotter, the President, in the chair—Mr. L. Gaster, the Hon. Secretary, gave an account of the progress during the vacation, of matters of interest to the members.

Mr. Gaster said in accordance with the arrangement entered into with the Institutions of Gas and Electrical Engineers, the President of the former (Mr. Samuel Glover) had kindly consented to become a Vice-President and Member of Council during his tenure of office; while Mr. C. H. Wordingham would continue to act in these capacities, which he undertook on his election to the presidency of the Institution of Electrical Engineers last year. While, as usual, no meetings had been held during the vacation, there had been various events of interest to the Society; and its co-operation had been sought in various matters. The need for economy in lighting had been increasingly emphasized during the past few months, and endeavours had been made to secure that such economies should be made in the most judicious way, and mainly through the elimination of waste of light. The series of recommendations on this subject, presented at the annual meeting, and more especially the schedule of consumptions of gas and electricity, and the corresponding illumination for industrial lighting, had proved very useful as a guide to the authorities. In regard to street lighting, the desire for economy also led to a proposition, on the part of certain London boroughs, that a further diminution should be effected during the summer months; and in August the authorities sanctioned a further reduction of 50 p.ct., as an experimental measure to effect economy in the consumption of coal. It was, however, stipulated that the reduction should be spread equally over both main and side streets, so as to be without prejudice to a uniform lighting effect; and, further, that the measure should be subject to revision should it be found that the reduced lighting led to increases in crime or danger to pedestrians or vehicular traffic, or impeded the supervision of the streets by an already depleted police force. Following the conclusion of the armistice, an official announcement was made on Nov. 12 withdrawing the regulations relating to the masking of lights, subject to the maintenance of 50 p.ct. of pre-war lighting, in the interests of economy. In view of the prospective resumption of normal lighting conditions, it was felt that the time was ripe for a complete discussion on the subject, taking into account the experience gained since the war; and it had accordingly been decided to arrange for such a discussion during the present session. The important decision at a meeting at the Mansion House, on June 12, to extend the "Safety First" movement to industrial operations, had since taken shape in the formation of the "British Industrial Safety First Association." Among those who materially contributed to the success of this useful development, special reference should be made to Mr. F. W. Goodenough, Mr. H. E. Blain, and Mr. Gray. The Illuminating Engineering Society was already represented on the Council of the new body; and it was hoped that the relation would be helpful in promoting the study of proper industrial lighting, with a view to the prevention of accidents. In other quarters the claim of good illumination in factories had also been strongly emphasized—for example, in the final report of the Health of Munition Workers' Committee, which endorsed the conclusions presented in the various bulletins issued from time to time, and included some striking instances of the results of inadequate illumination. In the United States further progress was made in legislation dealing with industrial lighting, and there were now five States that had adopted such regulations. The State of Wisconsin had revised its original code, and adopted comprehensive regulations, based on the provision of a specified illumination in foot-candles for various classes of work. An event of much interest was the British Scientific Products Exhibition. Through the courtesy of the Ministry of Munitions, the Society were able to exhibit some of the special photometers designed by a Committee of the Society, which had been carrying out investigations for the Ministry on flares, parachute lights, &c. The event of outstanding importance during the vacation had naturally been the conclusion of an armistice and the cessation of hostilities, whereby the necessity for some of the restrictions on lighting had already been removed. It was to be hoped that the near future would see the resumption of normal conditions in the lighting industry, which should play an important part in the various problems of reconstruction. A word of caution might be given. In the relief at the removal of restrictions that had prevailed during the war, there was a tendency to revert simply to pre-war practice in lighting. Yet they had something to gain from their experiences during the last few years; and they should therefore seek not merely to restore the old conditions, but to improve on them.

THE REINFORCED CONCRETE PURIFIERS AT TOTTENHAM.

The business meeting last year of the Institution of Gas Engineers (when Mr. A. E. Broadberry was President) was followed by a visit to the works of the Tottenham District Light, Heat, and Power Company, where, among other interesting features, the visitors were able to inspect some reinforced purifiers and an apparatus building constructed of concrete blocks made on a "Winget" machine. When describing the visit in the "JOURNAL" at the time [June 12, 1917, p. 485], photographs were given of the purifiers and building, together with a few particulars. The December issue of "Concrete and Constructional Engineering" contains an article, based on information supplied by Mr. Broadberry, which enables us to supplement what was then said about the novel use of reinforced concrete for overhead purifiers.

The quantity of gas to be dealt with was 5 million c.ft. per twenty-four hours; and the site lent itself to the erection of five purifiers, each 56 ft. 1 in. by 42 ft. 6 in. inside. Four of these form the main set. The gas passes through each in succession; and the remaining one is used as a catch-box. They are 6 ft. deep inside, and have to sustain a possible gas pressure equal to 4 ft. of water, in addition to a distributed load of about 300 tons of oxide, with the steel angles and wood grids required to support it. This represents a very heavy load on the main beams; and the sides have to resist the full pressure of gas from top to bottom, while the decks and gangways have to resist an upward pressure of the same amount, exerted on them and the covers by the gas. To minimize the effect of temperature—as the oxide sometimes heats-up—the main series of four was divided into two pairs, with a space between them wide enough for an elevator or conveyor. The fifth, or catch-box, was built as a separate structure.

The main beams, 33 in. deep, are divided into four spans, and are carried on columns 15 in. square for the interior, and 13 in. square for the exterior. These columns have reinforced feet resting on mass concrete foundations, with a steel mat to distribute the pressure. The secondary beams are 21 in. deep, the floor slab 5 in. thick, the sides 7 in. thick, and the decks and gangways 6 in. thick. Five pillars, 10 in. square, are used to support the gangways. These pillars form, of course, ties between the floor and top when the purifiers are closed and under pressure. Special provision was made for anchoring gangways and pillars. The mixture used was the usual one of 4:2:1; but for the columns a slightly richer mixture was employed, as they were made horizontally and elevated into position when set.

To render the concrete gas-tight, the purifiers were treated on the inside with "Ironite." Special provision was made to keep the weight of the massive 24 in. diameter pipes, forming the gas-mains, from coming on to the floor of the purifiers. There are also four discharge outlets provided for emptying each purifier. The covers are secured to lugs let into the concrete by a special form of eccentric fastening invented by Mr. Broadberry. When the vessels were completed, they were tested first with 4 ft. of water, which gave as great a load as the columns would bear, though it did not give the maximum load on the beams. The deflection of the latter only amounted to $\frac{5}{100}$ths of an inch. After this test, arrangements were made to flood the decks and gangways with 3 in. of water. The covers were put on, and an air pressure of 24 in. of water was applied. In one or two places a few air-bubbles were observed; but further treatment with a mixture of "Ironite" and cement immediately remedied these defects. The purifiers have been in use for a year. No defects have developed; and they are considered in every respect satisfactory—particularly as their cost was barely one-half of what it would have been if they had been made of cast-iron on a steel platform.

They were constructed by Messrs. Walter Jones & Sons, to the designs of Mr. Broadberry, assisted by Mr. J. Fisher, the Assistant Engineer of the Company.

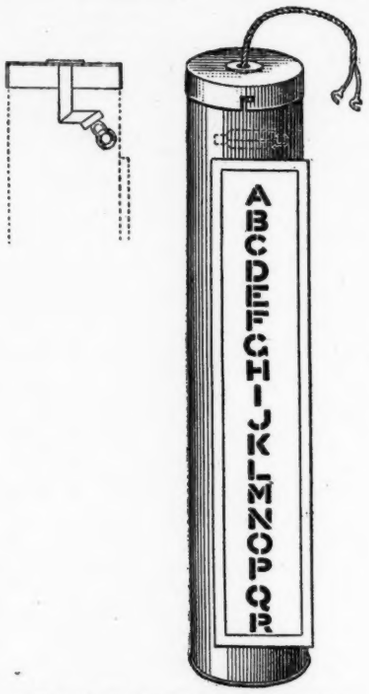
Increasing the Capacity of Gas-Meters.—There is a brief notice in the "Gas Journal of Canada" of a patent taken out by Mr. S. J. Moore, of the Dominion Gas-Meter Company, London (Ont.), for a device for increasing the capacity of gas-meters. In a meter provided with moveable diaphragms operating flag-wires, which by suitable rock arm and linkage systems actuate the valves and registering mechanism, there is a compound lever system between each flag-wire and its corresponding diaphragm, comprising a lever arm connected to the flag-wire, a lever arm pivotally connected to the diaphragm, and a stationary part on which the lever arm is fulcrumed—the lever arms having a rocking and sliding engagement the one with the other.

PHOTOMETRIC APPARATUS

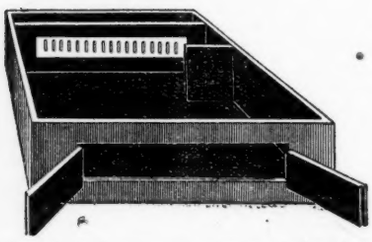
FOR MEASURING THE ILLUMINATING VALUE OF FLUCTUATING SOURCES OF HIGH CANDLE POWER.

This is an imposing-looking title; and it is not all there. It was at the top of a paper the President of the Illuminating Engineering Society (Mr. A. P. Trotter) read at last Thursday's meeting. We cannot reprint the paper, as it is a little outside our sphere; but reference may be made to it in order to draw attention to the part that Mr. J. G. Clark, of the Gas Light and Coke Company, and Mr. J. S. Dow had in devising light-measuring appliances for a specific purpose.

It was in August, 1916, that the Society was asked by the Optical, Glassware, and Munitions Branch of the Ministry of Munitions to take up the work of devising a method and apparatus for comparing the illuminating values of flash lights, flares, star-shell compounds, and similar rapidly-burning compositions. It was recognized that the mere measurement of candle-power would not define the performance of an illuminant. The quantitative part is comparatively simple—the quantity of light depending on



View of the Original Tube Photometer.



View of the Supplementary Flare Photometer.

the two factors of flux of light and time. The quantitative efficiency of any pyrotechnic mixture is the product of the two factors, candle power and time, divided by the mass of material consumed. The results were therefore expressed in candle-power-seconds per gramme. Since the rate of burning is irregular, it was necessary that the photometer should be so constructed that variations of light might be followed and measured at any instant, thus enabling a number of observations to be made at regular intervals.

The qualitative part of the problem was more difficult, and comprised estimates and attempts at measurements of detail-revealing power in its relation to rapidly-burning flares of great intensity, or to lights of less brilliance and longer duration, and to the effect of smoke and of different coloured flames. This part of the problem included the consideration of glare and dazzle which may be an advantage or a disadvantage in different circumstances; also eye-fatigue and after-images.

The Committee recognized that the peculiar conditions called for the construction of a new photometer which should be portable, self-contained, direct-reading, and purely inspectional, without requiring any manipulation or adjustment during use. It should be suitable for outdoor or indoor work, and no special training or photometric knowledge should be required. A photometer meeting all these requirements was produced; the design being that of Mr. J. G. Clark, and was only slightly modified by subsequent experience. A second photometer of a different kind was afterwards produced by Mr. J. S. Dow.

The first of these instruments consists of a tube 635 mm. (25 in.) long, and 75 mm. (3 in.) in diameter. The interior is whitened, and is illuminated by a small electric glow lamp placed at one end. A slot 5 mm. (0·2 in.) wide extends nearly the whole length of the tube, and this is covered with a strip of thin metal having perforations in the form of letters or numbered and graduated slits. This strip is painted white, and receives the illumination to be measured. Since the interior of the tube is brilliantly illuminated at one end, and but feebly illuminated at the other, the perforations near the electric lamp generally appear to be brighter than the externally illuminated strip, and those at the other end darker. An intermediate point can be estimated where the brightness of the interior of the tube is equal to that of the external strip. It is a somewhat Irish characteristic of the photometer that the letter must be chosen which cannot be seen. In the case of a flickering light, the point of balance continually moves. The illumination corresponding to each perforation is ascertained by calibration in a photometric laboratory. The lamp is supplied by a portable battery; and so long as the voltage is constant the calibration may be depended upon.

It might seem that a number of slits forming a grid, as in the photometer invented in 1894, would be better; but this is not the case. It would be necessary to choose the disappearing slip and then to read its number on a graduated scale. Perforations in the form of numerals suggest themselves; but beyond the ninth, double numerals would have to be used. Letters are therefore better; but the great advantage which they offer over numerals is that the names of all but W are monosyllabic; and they can be dictated clearly and rapidly by an observer, who never takes his eyes off the instrument, to an assistant who writes down the readings. The illumination falls off rapidly at the bright end and changes gradually at the darker end. This is rather a disadvantage. Several attempts were made to remedy it.

The second instrument consists of a light wooden box, 280 mm. (11 in.) by 280 mm. (11 in.) by 102 mm. (4 in.) deep. The observer looks through an opening cut in one side of the box and sees on the farther side a grid of fourteen slots cut in white paper or card. The grid is illuminated by a small electric lamp placed on one side in the box, and screened from the observer. The illumination of the grid therefore is graded like the interior of the photometer already described. Observation is made by looking through the slots at a detached test screen which receives the illumination to be measured. As in the other photometer, a point can generally be found where the brightness of the slotted card appears to be equal to that of the test screen seen through a certain slot. A graduated scale gives a measure of the illumination thus deter mined. Unlike the other instrument, a range much wider than that afforded directly by the slots is obtained by using test screens of various tints of grey. As a rule, a white screen 300 mm. (11·8 in.) long and 102 mm. (4 in.) wide is placed about 1 metre distant. If the observer finds that the balancing point is near the darker end of the scale, he can at once direct his view to an adjacent screen of a grey tint. The balancing point becomes shifted to the other end of the scale. Each tint has a definite multiplying factor found by experiment.

The paper gave some general indication of the work carried out with these instruments in testing flash lights, flares, &c., for the Ministry of Munitions.

PRODUCTION OF OIL FROM MINERAL SOURCES.

At a meeting last Tuesday evening, at the Royal Society of Arts, Adelphi, before the Institution of Petroleum Technologists, a paper on the "Production of Oil from Mineral Sources" was read by Mr. F. Mollwo Perkin, Ph.D., F.I.C., F.C.S., who drew attention to some aspects of low-temperature carbonization. Incidentally he mentioned that a company is being formed with the intention of trying the various low-temperature retorts which have been invented, with a view to finding one which will give satisfactory results. If this is not achieved, the company will devise a retort of their own. The company are prepared to spend £100,000; and it is not intended to ask the Government for a halfpenny. The company wished, he said, to do it "off their own bat;" and if they could prove what they desired to prove, it would be very much better for the country than the way things were going on at present.

It was pointed out by the author that whether high or low temperature should be employed for carbonizing bituminous material depends on what products are required. For gas-works, where any large volume yields of gas are needed, high temperature is essential; but where motor-spirit, fuel oil, lubricating oil, and paraffin wax are required, low temperature carbonization must be adopted. In low-temperature carbonization, the gas produced is less than half that obtained by high-temperature carbonization, and contains less hydrogen and more hydrocarbons than the

latter. Low temperature carbonization could not therefore be employed for the manufacture of gas for lighting purposes. When coals high in volatile elements and rich cannels are subjected to low-temperature distillation, much larger yields of crude oil are obtained. Oils obtained by the carbonization of bituminous material come under the same category as natural oils. They may therefore be classed as mineral oils, even though their origin was probably organic, as was that of natural oils. Many organic substances—such as peat or wood—will give oils of a very similar character, when carbonized under suitable conditions.

At the outbreak of the war the world's production of natural oil was in the neighbourhood of 50,000,000 tons; and last year it was over 60,000,000 tons. Before the war Great Britain was, with the exception of the oil obtained from the Scottish shale oil industry, entirely dependent upon imported oil for all the various purposes for which oil is required. Unfortunately, we are still in the same position. We have at hand mineral resources from which we can produce mineral oils—petrol, fuel oil, lubricating oils, and paraffin wax. Why then do we not employ these sources? There are, of course, many difficulties in founding a new industry, and one of the greatest has been Government action, or inaction. There is now, however, a stirring among the dead bones. A great deal of experimental work has been carried out, much of it on semi-commercial plant; and there are several large schemes under consideration, which would involve the putting-up of an extensive plant both for retorting and refining the oil, and to obtain power from the residuals, or domestic fuel. Historically, the first low-temperature distillation process was devised by James Young in 1847; and his process was largely worked in America until the advent of natural oil in 1859, and the accompanying oil fever, when the distillation of shale was discontinued. Young's patent expired in 1864; and this led to a great expansion in the Scottish oil industry. Shortly after, however, owing to the output of natural oil and American competition, it experienced a severe check.

The amount of shale treated in the Scottish retorts is over 3,000,000 tons per annum, which before the war produced about 275,000 tons of crude oil, or over 70,000,000 gallons. The marketable products produced by the distillation and refining of crude oil and their approximate yields are on a pre-war basis;

Motor spirit	600,000	gallons.
Naphtha	4,400,000	,,
Burning oil	20,000,000	,,
Gas or fuel oil	12,000,000	,,
Lubricating oils	10,000,000	,,
Paraffin wax	25,000	tons.
Sulphate of ammonia	55,000	,,

The total value of the resulting products exceeded £2,000,000 per annum.

In the retorting of shale, ammonia is one of the most important products produced; and the retort is specially designed to obtain the maximum yield both of oil and ammonia. The oil is produced in the upper cooler portion of the retort, and the ammonia in the lower hotter portion, where the shale which has been freed from the main portion of the volatile matter is acted upon with superheated steam. As far as the production of oil is concerned, the retorting of shale is a low-temperature process, but mediumly high for the production of ammonia. The residue from shale which remains after it has been entirely freed from its volatile matter and acted upon by superheated steam contains no free carbon, and consequently is valueless as a fuel, in that it contains no combustible matter; and unfortunately the mineral residue is also valueless, as is witnessed by the enormous dump-heaps to be seen wherever shale is retorted.

The ordinary shale retort is not adapted for dealing with caking bituminous material, nor, indeed, for treating cannel and non-caking coals; hence the large amount of research work which has been carried out in the endeavour to devise a suitable retort for dealing with bituminous material which contains a large amount of fixed carbon, and will yield, after extraction of the volatile matter, a good fuel for domestic purposes. It might be replied, "But this is already obtained in the gas-works where, when coal is carbonized to produce gas, a residue of from 68 to 70 p.ct. remains in the form of coke, and besides which tar and ammonia are produced." True, coke is produced; but this coke contains a very low percentage of volatile matter, and for this reason is not adapted for burning in the ordinary grate. Coke produced by low-temperature carbonization (350° to 550° C.) is softer than that produced at high temperatures (above 900° C.), and usually contains from 7 to 11 p.ct. of volatile matter. The presence of this volatile matter causes the coke to burn readily—practically without flame or smoke—and to give out a great heat. It is consequently very clean for household purposes; and if it were used instead of coal, the cost for painting and decorating the house would be very considerably reduced. Furthermore, the atmospheres of our large towns and cities would be very much less contaminated by smoke, and the living conditions would be healthier. In producing this smokeless fuel by low-temperature carbonization, there are produced at the same time oils of the aliphatic series, which on refining yield motor spirit, fuel oil for internal combustion engines or for direct boiler-firing, lubricating oils, and paraffin wax, besides which there is a small quantity of ammonia and sufficient gas to fire the retorts and leave a small surplus.

Now, in low-temperature practice, there are two possibilities either of which might be a financial success; or they might be combined.

1.—The production of oil and smokeless fuel.
2.—The production of oil, and the conversion of the fuel resi due into power gas by gasifying it in a producer.
3.—The production of oil, using a portion of the fuel for domestic purposes and gasifying the remainder.

In districts where power is not required for manufacturing purposes, but where coal or cannel could readily be obtained without having to transport it for long distances, the first proposition would be the one to embark on. On the other hand, where cheap power in large bulk is required, No. 2 would be the process to take-up. Probably in all cases a certain proportion of the residue would be sold as smokeless fuel.

It is again necessary to meet an objection which is sometimes raised. "If you want power, why not gasify the coke produced in the gas-works in a producer?" Well, there are uses for coke as produced by the gas-works; and there is the difficulty in gasifying it in producers that coke produced at high temperatures, and containing very little volatile matter, only yields a small proportion of its nitrogen in the form of ammonia. A good yield of gas, however, is obtained. The author quoted results, in actual practice, of gasifying 50 tons of coke produced in the low-temperature plant of the Tarless Fuel Syndicate, and a similar quantity of coke produced in Glover-West retorts (where the temperature of the flues was about 1400° C.) to show that the amount of sulphate obtained was much larger with the low-temperature coke than with the high-temperature coke. On the other hand, he added, it must be borne in mind that in gas practice more than double the quantity of gas of high calorific value is produced than by low-temperature carbonization; and the initial yield of sulphate is more than double that obtained in low-temperature practice.

I.—*Coke Produced in the Tarless Fuel Syndicate Plant.*

Moisture	3·20 p.ct.
Volatile matter	9·87 ,,
Fixed carbon	74·54 ,,
Ash	12·59 ,,
Nitrogen	2·00 ,,
Yield of gas per ton	128,000 c.ft.
B.Th.U. of gas	139
Sulphate of ammonia	101 lbs. of 24·5 p.ct.

II.—*Coke Produced in Glover-West Retorts.*

Volatile matter	1·31 p.ct.
Fixed carbon	86·90 ,,
Ash	9·27 ,,
Nitrogen	1·53 ,,
Sulphur	1·00 ,,
Yield of gas per ton	175,000 c.ft.
B.Th.U. of gas	132
Sulphate of ammonia	23 lbs.

Continuing, he said: I wish again to insist on the absolute difference in the products obtained by carbonizing at high and at low temperature. This insistence is necessary, because I have frequently heard it remarked that the tar or crude oil obtained by low-temperature carbonizing can be used for making dyes, &c. I have even heard those engaged in producing this crude oil make this remark, followed by saying: "If we go in for this process we shall be able to win the dye industry back from Germany." The Coalite Company, or rather the Company who own the Coalite Company, claim their process to be a low-temperature process, and then claim that they produce more benzol and toluol than is produced in high-temperature gas practice. All I can say is that, if they produce benzol and toluol, then either their process is a high-temperature process, or else they treat the crude oil by some cracking process. If, however, they require benzol and toluol, why produce it in two stages?

I believe that one of the reasons why low-temperature carbonization has, so to say, hung fire, is due to the exaggerated claims made by the inventors, backed up by company promoters. In all distillations of bituminous material, water is obtained along with the oil, and is at times extremely difficult to separate, as the specific gravity of the crude oil approximates to that of water. In fact, it is not unusual to find 30 to 40 p.ct. of water in the crude oil. This has all been lumped-in as oil; hence the impossible claims for oil yields which have been made. The days of exaggeration are, I trust, passed; and careful research has taken the place of romance. If the claims are more moderate, at any rate we are working on a sure foundation; and many of us believe that a home oil industry can be founded on business lines which, though not rendering us self-supporting, will supply a portion of our needs, and tend to prevent exploitation.

The Government were pressed to give facilities for testing various retorts to ascertain which would be the best for big-scale work. Instead of assisting those who had experience with fuel oils, and granting facilities for erecting plant, to supply the very much needed oil, they approached the gas-works, and asked them to produce the fuel oil. The Government were requiring at the same time benzol, toluol, &c.; but it is not possible to produce fuel oil—except in the form of creosote—at the same time as benzol and toluol. Why, then, did they ask the gas-works to carry out tests by heavy steaming of cannels, and obstruct and withhold facilities for putting up low-temperature carbonizing plant? The gas engineers rose to the occasion. Dr. Harold G. Colman, that veteran Mr. John West, and also Mr. John Bond worked at a process for steaming on vertical retorts, and were

able to produce a fairly good fuel oil. What, however, did it amount to? The Mineral Oil Production Department undertook to adapt the following installations of retorts:

Nottingham (started May, 1918)	treated	150	tons	of coal	per day.
Dundee (started September 1918)	,,	200	,,	,,	
Bradford	,,	,,	,,	200	,,	,,
Bolton (never completed).					
Nelson	,,	,,			

Nottingham had worked for seven months, and produced 945,000 gallons; Dundee and Bradford worked two-and-a-half months, and produced 450,000 gallons each—making a total production of 1,845,000 gallons. The cost of the conversion of the retorts was £100,000. The average cost of material treated was 25s. per ton. The average amount of distillate obtained was stated to be 30 gallons per ton of material carbonized, which made the cost of the oil 1s. per gallon, excluding labour and operating charges. The coke was practically valueless, owing to the action of the superheated steam on the free carbon.

DISCUSSION.

The PRESIDENT (Mr. Charles Greenway) said now that the censorship was over, he hoped every possible light would be thrown on this question, in view of the enormous importance of it both from the economic and the national point of view.

Prof. J. S. S. BRAME regarded it as a very great tribute to British industry that the shale-oil industry had held its own and developed as it had done in face of overwhelming natural difficulties. He thought it augured well for the future in the matter of low-temperature distillation of other products than shale. It was extremely difficult, with a problem like destructive distillation, to differentiate between primary actions and secondary reactions. There was, in the first place, the evolution of certain products from the coal as the coal was heated; and, in the second place, there was a complete transformation, in some cases, of these primary products at higher temperatures, either in contact with the walls of the retort or in contact with the heated carbon of the retort. These were problems which it was very difficult to solve; and he would like to ask if the author had any information to give in relation to the effect of temperature primarily on the bituminous substance—*i.e.*, whether it made any difference if the coal was dropped straight into the retort at 500° or whether it was dropped on to the hot surface at 800° or 1000°. He was referring to comparatively small masses of coal. There were one or two processes which had not been described in the paper. Probably some of them were familiar with that of Mr. M'Laurin, of Glasgow, in which a highly heated producer gas was passed through the carbonizing retort; and in this way some oils were obtained which were very different from anything previously described in the literature—oils which were almost wholly soluble in caustic soda. Another process had recently been developed in America. The coal was first carbonized at a temperature of 450°, and as large a quantity as possible of the low-temperature oils was obtained. Then it was suggested that the residual coke should be briquetted with pitch, and that these briquetted masses should be further retorted, in this way recovering more heavy oils. It was claimed that this process, no matter what the original material might be, gave a good material suitable for domestic fuel.

Dr. DUNSTAN said he was particularly pleased with Dr. Perkin's crusade *apropos* of the claims in connection with the formation of benzol and toluol in low-temperature processes. It was perfectly obvious that a temperature of 700° C. was about the minimum for the formation of these products. There was a good deal of misapprehension as to the production of these valuable hydrocarbons. In common parlance, coal tar was referred to as the source of these materials; but, in point of fact, it was the stripping of the gas that yielded them. He would like to emphasize the extreme importance of a thorough research on the composition of coal, and of the different types of coal. It was gratifying that the pioneer work on the constitution of coal was entirely British. The investigations to which he had referred, and also those of Bedson, suggested that, though coal was usually described as being a form of carbon, it was possible that it was a complicated hydrocarbon. The crux of low and high temperature distillation was concerned with the curious fact that at about 700° C. there was a marked difference in the products. Below this temperature, practically a mineral oil was obtained; while above it a large evolution of hydrogen took place, and the well-known aromatic hydrocarbons were secured. Parr, an American chemist, three or four years ago subjected a number of American coals to low-temperature distillation, and stated that the semi-coke, which contained 18 p.ct. of volatile matter, worked well in a suction-gas producer plant, and was equal, or nearly so, to anthracite. The volatile matter also rendered it an admirable domestic fuel. The tar was rich in light oils, the pitch was low in carbon content, and the tar acid was admirable from the point of view of a wood preservative. Furthermore, 10 p.ct. of the distillate of the low-temperature oil was free from acids, and could be used directly in internal combustion engines. The point which impressed him about Parr's work was the suggestion that these low-temperature oils, as distinct from coal-tar oils, offered a new field of research altogether. With regard to the occurrence of ammonia, which was highly important in connection with the technology of the process, it had been shown by Cobb that at 800°, in the presence of steam, it was possible to obtain practically the whole content of nitrogen as ammonia.

Sir BOVERTON REDWOOD wished to emphasize the fact that, since the subject was first under discussion by the Institution, circumstances had happily completely altered, and they were now in the position to do what could not be done last February—viz., to lay the foundations of a permanent industry. He felt very strongly that they ought to have, as soon as possible, investigations, with the object of having the low-temperature distillation process placed on a commercial basis within a year or two. He confessed he was a little surprised to hear the practice in connection with Scottish shale, in relation to the obtaining of oil, referred to as one of low-temperature distillation. When they took into consideration the diameter of the Scottish type of retort, it must be perfectly evident that, in order for the centre of the charge to be raised to a temperature sufficiently high, the exterior portion of the charge in contact with the walls of the retort must of necessity become over-heated. What was wanted at the present moment more than anything else was practical testimony, based upon large-scale commercial tests, with a true low-temperature distillation of materials which the lecturer had shown were largely unutilized, and might be made a source of great quantities of oil. As would be remembered, the outcome of the discussion of this subject last February was the formation by the Institution of an exceptionally influential and representative Committee to obtain evidence in respect of the cannel coal and allied materials available in Great Britain as sources of motor spirit, fuel oil, and other products, and to formulate a scheme for the utilization of such supplies. In July of this year an interim report was made public, in which there was the statement that the Committee had already, as the result of their investigations, obtained evidence which they held to justify them in saying that at least 10,000 tons a day of retortable material could be economically assembled for treatment, provided the necessary facilities were given by the Government, and the requisite labour were available. The interim report also stated that, as the result of tests carried out on the various processes which had been established, a yield of from 15 to 80 gallons of crude oil per ton could be obtained from existing materials in the British Isles, which would give 300,000 gallons per day or upwards of 400,000 tons a year.

Mr. ORMANDY called attention to the fact that lignite had been distilled in Austria for very many years, and said he once visited a works there which had seventy bye-product recovery ovens for brown coal. The residue after distillation was ground, and the pitch and tar produced from the distillation used to briquette the carbonized lignite. The gases coming away from the coke-ovens were carried through hydraulic mains, which were jacketed with magnesia, as also was the main pipe leading to the washers. The gases containing tars and oils were cooled in fractional washers, so that in the first washer the heavy tar was produced, in the second light tar, in the third heavy oil, and from the fourth washer there was a constant stream of pale yellow oil, which was sold for lighting without any further refining. With regard to the lignites on the South Coast, if these beds were properly developed, there was no reason why the South of England, which hitherto had failed to be a manufacturing district, should not become a great source of wealth.

There was not time for Dr. Perkin to reply to the discussion.

Chamber-Ovens in Medium-Sized Works.

Two years ago, Mr. Henry W. Douglas, the Manager of the Washtenaw Gas Company, Ann Arbor, described in a brief paper which he presented to the Michigan Gas Association an installation of chamber ovens at his works; and some of the particulars given were reproduced in the "JOURNAL" for Nov. 21, 1916, p. 390. Since then the plant has been doubled, and additional information about it was submitted by Mr. Douglas at this year's meeting of the same Association. The installation now consists of six oven benches, containing three ovens each; all of these being built on the former foundation of six benches of sixes, of three-quarter depth, with the foundation only slightly increased. The ovens are 6 ft. high, 12 in. wide, and 13 ft. 6 in. long; and in the top of each one there are two charging-holes. The coke is discharged by an electrically-driven ram; and a rake operated by the same means levels the charge. Baffle-plates are introduced about 10 in. inside of the oven doors, which are carried on hinges, and are self-sealing. Having had twenty months' experience of the arrangement, the author says the greatest uncertainty about the installation was the ability to evenly and efficiently heat the ovens and burn off the charges in a reasonable time. Owing to the positions of the heating flues, the centre oven is considerably hotter than the outside ones; and the tops of all three ovens are somewhat overheated. It was anticipated that a charge of 2600 lbs. of coal could be burned-off every eight hours. Experience has shown that an increase to about 2800 lbs. is possible, but that no regularity as to schedule of charges is possible. The charge in the middle oven can be burned-off in eight hours, while the outside ovens run from ten to twelve hours. Therefore the only practical method of operation is to push the charges when they are thoroughly burned. The crusher is set to give a maximum of 1¼ in. lumps of coal, which is found more suitable than smaller sizes. Some other troubles were met with and overcome; and Mr. Douglas urges those contemplating similar installations to have plenty of ventilation over the top of the bench; have a thorough flushing of the hydraulic and foul mains, to prevent pitch stoppages; abandon the idea of self-sealing doors; in the design of flues, take precautions against overheating; and provide for easy access to all flues. Both objects which it was hoped to gain have been attained—a substantially increased make with the same retort-house space, and considerably reduced labour cost. Up to the present, the ovens show no appreciable wear; and the setting has developed no cracks.

The Department of Scientific and Industrial Research and the Medical Research Committee have jointly appointed a Research Board (under the chairmanship of Prof. C. S. Sherrington, D.Sc., F.R.S.), to consider and investigate the relations of hours of labour and of other conditions of employment—including methods of work—to the production of fatigue, having regard both to industrial efficiency and to the preservation of health among the workers.

KOPPERS CHAMBER OVENS FOR COAL GAS MANUFACTURE.

The "Journal für Gasbeleuchtung" has been publishing recently—Vol. LXVIII. pp. 433-6 and 445-50—an article entitled "Technical Scale Tests on the Efficiency of Coal Gas Manufacture in Koppers Chamber Ovens." It was written by Herren K. Bunte and E. Terres; and it has been abstracted for the current issue of the "Journal of the Society of Chemical Industry."

The abstract points out that a series of efficiency tests were carried out in 1912 at the Vienna-Leopoldau Gas-Works on the Koppers system of chamber ovens. The plant consisted of 72 chamber ovens in ranges of nine. During the tests five ranges were working. Each chamber was 10·3 m. long, and had a breadth of 540 mm. at the discharging end, tapering to 480 mm. at the charging end. Four regenerators were built under each oven, for heating the cold producer gas and secondary air by heat from the waste gases. The ovens were supplied with producer gas from an external generating plant consisting of twelve Kerpely producers, five of which were at work. The water-jacket steam-boilers on these producers generated all the necessary steam. The volume of producer gas made was calculated on a carbon balance-sheet obtained from analyses. It was shown by one test that 11·17 kilos of coke were burned in the producer during the carbonization of 100 kilos. of coal, and also that 663 calories had to be supplied as producer gas to the ovens to carbonize 1 kilo. of coal. The following thermal balance-sheet was obtained for a one-day test on the producers:

Energy supplied to the Producer:

	P.Ct.
Heat of combustion of the coke	96·97
Heat in steam supplied under the grate	3·03
	100·00

Energy subtracted from the Producer:

	P.Ct.
Calorific value of gas	79·13
Sensible heat in dry gas	0·46
Latent and sensible heat in moisture in gas	1·80
Heat used in evaporating feed water	15·56
Heat in unburnt combustible matter in clinker	0·71
Heat in unburnt combustible matter in flue dust	0·20
	97·86
Heat lost by radiation and conduction (by difference)	2·14
	100·00

The percentage composition of the producer gas was: CO_2, 3·65; O_2, 0·2; CO, 29·12; H_2, 9·88; CH_4, 0·2; N_2, 56·95. The thermal balance-sheet for the ovens showed that the heat doing useful work in the ovens amounted to 71·1 p.ct. of the heat of combustion of the coke used in the producers, whereas the producer gas itself contained 81·6 p.ct. of the heat of combustion of the coke used in its production. The difference represents the heat lost in the waste gases, and by radiation from the ovens.

EFFECTS OF AMMONIA RECOVERY.

By T. B. SMITH, of Stocksbridge.

[A Paper read last Saturday before the Midland Section of the Coke-Oven Managers' Association.]

In writing this paper, I have completely disregarded the semi-direct recovery plant, because of its complicating tendency to assume the advantages and disadvantages of both the direct and indirect processes. Many articles have appeared in the Technical Press comparing the two processes; but these have usually been restricted to the sulphate of ammonia plant itself, and to such mechanical advantages of the direct process as: (1) Compact plant, with elimination of ammonia scrubber. (2) Minimum steam consumption. (3) No lime required, and abolishing an old eyesore—the lime-mixing plant. (4) Liquor storage not required. (5) Increased efficiency in recovery of ammonia by chemical reaction with acid, over the mechanical solution by water.

I have therefore attempted a comparison of the effects of the two processes upon the working of the other parts of the plant. The direct system is as yet the nearest step the coke-oven industry has taken towards the idealist's "fractionation of the hydrocarbons in the tar-main." The tar is brought down at a temperature considerably above the dew-point of many of the hydrocarbons, which, in consequence, are dephlegmated free from the heavier constituents—thus effecting a definite split. But many of the possible advantages of this have been neglected; the final effect being to remove a considerable portion of work from the tar distillery and add it on to the already overburdened benzol rectification plant.

TAR.

This clean-cut in the condensation of the hydrocarbons naturally has a drastic effect upon the tar, the viscosity of which is so great that in cold weather it is more like pitch. If a tar distillery is installed on the plant, the trouble is not so acute, since by keeping the tar hot it can be easily handled. But where it has to be loaded into tanks and dispatched by rail, considerable trouble arises in the emptying of the tanks—this necessitating dilution by the constant addition of thick oil from the benzol plant. It forms, however, an excellent outlet for the substance, which is returned to the parent body, to make a normal tar, after having served an excellent purpose. Upon distillation, only a negligible quantity of benzol, its low-boiling homologues, and pyridine bases are obtained. A very poor yield of phenolic bodies is also noticed, the total yield of oils being 40 to 50 gallons per ton of tar, consisting of, approximately, 25 gallons of creosote and 20 gallons of anthracene oil, leaving a pitch residue of, approximately, 14 cwt.

COLORATION OF SULPHATE OF AMMONIA.

With the formation of yellow and blue salt I do not intend to deal, since it is obvious these are the result of circumstances having no bearing upon the type of plant used; arsenical acid and alkaline baths giving the above results in all cases. The pink coloration of the surface of the salt is, however, peculiar to the direct process. Various theories have been advanced as an explanation; but, so far as I am aware, none have been proved. The two main suggestions are that (1) phenolic bodies and (2) cyanogen compounds are the cause of the coloration, and my experiments have fully proved the latter to be correct.

Three common constituents of coke-oven gas are: (1) Water vapour, (2) ammonia, (3) carbon bisulphide. From these it is believed that ammonium sulphocyanide is formed in the following manner: $6NH_3$, ammonia; $3H_2O$, water; $3CS_2$, carbon bisulphide; $2(NH_4)2CS_3$, ammonium thiocarbonate; $(NH_4)_2CO_3$, ammonium carbonate. The ammonium thiocarbonate then decomposes into sulphuretted hydrogen and ammonium sulphocyanide: $(NH_4)_2CS_3$, ammonium thiocarbonate; $2H_2S$, sulphuretted hydrogen; $(NH_4)S(CN)$, ammonium sulphocyanide.

The ammonium sulphocyanide, on entering the saturator in the direct process, most probably before it is decomposed by the acid, forms a complicated compound with the iron; the latter being present as an impurity in the acid. An apparently white salt is obtained; but it colours quickly upon exposure to the air, due to the presence of slight traces of a blood-red ferric thiocyanate, the coloration of which, according to the ionic hypothesis, is due to the unionized molecule $Fe(CNS)_3$, since neither the ferric ion ($Fe^{\cdots}$) nor the thiocyanate ion (CNS^{1}) is coloured. The coloration is intensified if more ferric salt is added; the addition of a common ion causing part of the ionized salts to re-combine to form molecules of the coloured unionized ferric thiocyanate. This addition is caused by the gradual oxidation of the traces of ferrous sulphate always present in commercial ammonium sulphate. It is therefore obvious that the gradual intensification of the pink coloration is the immediate result of the gradual formation of ferric salts from the oxidation of the slight traces of ferrous sulphate.

In the case of the indirect plant, the ammonium sulphocyanide is washed from the gas at the ammonia scrubbers, or is recovered in the oxide purifiers, where these are in use. When the ammoniacal liquor is distilled with lime in the ammonia still, calcium sulphocyanide is formed, which passes away in the effluent; this being one of the most troublesome substances to deal with in the subsequent steps of the process.

EFFLUENTS.

It is not unusual to hear the indirect plant spoken of as "the process with an effluent," and the direct plant as "the process without an effluent." Although most people connected with the industry understand these sayings, they are literally very incorrect. When carbonizing wet coal, containing about 10 p.ct. of moisture, approximately 22·4 gallons of water have to be got rid of for every ton of coal carbonized, no matter what process of ammonia recovery is in use, although in the indirect plant the quantity is considerably increased by the milk of lime and the steam condensed in the ammonia still. The two effluents, (1) the well-known waste liquor from the ammonia still, and (2) the condensings from the gas at the cooling plant, after the saturators on the direct plant, are, however, of a widely different character, as a comparison will readily show.

(1) The spent liquor from the ammonia still contains carbonates, sulphides, thiosulphates, sulphates, sulphocyanides, ferrocyanides and chlorides of calcium, also sulphates and chlorides of sodium, phenols, and tar oils, together with the excess lime. It has first to be allowed to settle, in order to recover the "lime mud"—a most troublesome and useless substance. The clear liquid is a constant source of trouble. It is usually discharged into the nearest stream or sewer, and occasionally causes serious nuisance, when it comes into contact with other effluents and evolves deleterious gases. The ingredients of the clear liquid have been proved to interfere considerably with the bacteriological treatment in the purification of sewage. The most serious constituents are the sulphocyanides, the percentage of which, it is hoped, will be diminished when the industry has developed to such an extent as to consider the recovery of cyanogen compounds as important as the recovery of ammonia. In some cases the effluent is used for coke quenching; the result being that the coke has a very bad appearance.

(2) I give below an analysis of the condensings taken from the coolers of a Simon-Carvès direct plant:

	Per Cent.
Free ammonia	0·0184
Fixed ammonia	0·0061
Total ammonia	0·0245
Carbonic acid	0·0088
Hydrochloric acid	0·0010
Hydrocyanic acid	0·0135
Sulphuretted hydrogen	0·0115
Sulphur as sulphates	0·0012
Sulphur as thiocyanate	0·0025
Total sulphur	0·0148
Phenols	0·1947

Of the total percentage of impurity, it will be seen that the greater portion are gaseous or easily volatile substances. It may, therefore, properly be used for the quenching of coke, the appearance of which is as good as when quenched with fresh water.

COOLING PLANT.

The naphthalene trouble of the cooling plant with the direct process is exceptionally great. By using a suitable preventative, however, the condensers can be kept clean for as long a period as with the indirect process. The naphthalene, the dew-point of which varies according to the humidity of the gas, but is generally in the region of 30° to 40° C., is deposited on the tubes of the condenser. At this temperature, creosote oil is an excellent solvent, and when sprayed into the tubes will absorb the precipitated naphthalene, the heavy naphthas, and the phenols, but will leave the lower boiling fractions, which are cooled further and pass to the benzol scrubbers. There are three modifications in use of this method; these being in the final treatment of the salty oil:

(*a*) The first method, which necessitates the presence on the plant of a tar distillery, is to circulate a quantity of oil through the condensers, until saturated with naphthalene, and then transfer it to the tar plant for redistillation and the recovery of the absorbed constituents; the oil being returned to the condensing plant for further use.

(*b*) The second method is to separate out the naphthalene from the salty oil by allowing the latter to cool in shallow pans. These two methods, however, were found to be quite inadequate, since the oil, half saturated with naphthalene, &c., is only half as efficient as fresh oil, and the nearer to saturation the farther from absorbing efficiency.

(*c*) A third method was therefore introduced, which not only meets the originators' requirements, but also holds out considerable possibilities for the recovery of bye-products at the benzol plant. This method, which we can call the "compensation method," has been quite successfully in use on various plants for a few years. The usual procedure is to spray the last condenser with denuded oil, which afterwards, together with condensed water, runs into a common separating tank connected to all the condensers. The oil is decanted into an oil-sump, whence it is pumped to the first condenser sprays, and the water passes to the quencher ponds.

In order to keep the quantity of spray oil constant, it is necessary to withdraw from the oil-sump an equal quantity to that of the fresh oil added to the final condenser; this being added to the benzolized oil on its way to the benzol still. By this means fresh oil is constantly added to the spray oil and an equal quantity of moderately salty oil withdrawn, The naphthalene, heavy naphthas, and phenols are distilled out by the benzol still, and should be treated according to circumstances. With an ordinary still and condenser the benzol works chemist has to choose whether he shall make low-strength benzol or leave these intermediate substances in his wash-oil (the latter usually having a disastrous effect upon its washing efficiency). Where a rectification plant is attached, he would choose the former; but where the crude benzol has to be dispatched as 65 p.ct. to another firm for rectification, other expedients have to be used. The Simon-Carvès plant is, so far as I am aware, unique in its method of raising the strength of the benzol while entirely stripping the oil. Complete denudation is effected in the still; the light vapours being dephlegmated from the creosote, naphthalene, cresols, heavy naphthas, and the bulk of the condensed water in a primary condenser, the outlet temperature of which is maintained at about 92° C. The intermediate substances are led to a separating tank, where the water is removed; the oil being then cooled in shallow pans for the recovery of the naphthalene.

At a number of plants I know the cooled oil is returned to circulation. This, I venture to state, is a most serious mistake, since it considerably reduces the benzol saturation point of the wash-oil. The most valuable constituent of this mixture of intermediate substances is from 7 to 10 p.ct. of phenolic bodies, which at the present market price is an item of considerable importance. It should therefore be treated at the tar plant. In nearly every case where a rectification plant is in use, the management have recognized the advantage of making low-strength benzol; but I cannot say that they have recognized the increased advantages where the direct process is also installed. When low-strength benzol is made, where the direct process is in use, the analysis shows from 3 to 7 p.ct. of cresols, which in the ordinary method of rectification are left in the residue from the fractionation still, and get back into the wash-oil.

The crude benzol is pumped from the storage tank to the fractionation still in one stage. Where the percentage of cresols warrants this, may I suggest that it be pumped, instead, to the washer, and washed with 40° Twaddel caustic soda solution—running the sodium cresylate solution to a storage tank and the washed benzol by gravity to the fractionation still? The sodium cresylate should be sprung in a lead-lined washer in the open air, since the dilute acid attacks the ordinary cast-iron benzol washer, and also the vapours of cresylic acid affect the eyes very considerably. It is therefore by far the best to sell the solution as such or spring it at the tar plant.

CYANOGEN RECOVERY.

The commercial value of cyanogen compounds has been too low hitherto to encourage its recovery in this country; but production has considerably increased since the outbreak of war. It is therefore now quite a commercial proposition to recover cyanogen from coke-oven gas. The Bueb process, which is in operation at a number of plants in America, is perhaps the best suggested. This is to scrub the gas before entering the ammonia saturator with a 25 to 30 p.ct. solution of ferrous sulphate, which combines with the cyanogen, sulphuretted hydrogen, and ammonia. The resulting solution and precipitate are acidified and heated to drive off the sulphuretted hydrogen—being afterwards filtered and the precipitate pressed. The resulting yield is the double ferrocyanide of ammonia and iron and ammonium sulphate; the latter substance being removable by washing with warm water. A considerable number of difficulties have, however, been met with in scrubbing the gas before the saturators—by its effect on the sulphate of ammonia, by mechanically carried-over products of the above reaction into the saturator, and by the various impurities found in the cyanogen compound formed. Cyanogen and sulphuretted hydrogen, if anything, are purified by the acid in the saturator, being thereby liberated from combination with other elements. These gases are therefore left, in the direct process, to travel in a free state through the cooling and scrubbing plant back to the ovens. By recovering the cyanogen after the saturators, ultimate products could be obtained of greater purity than those obtained in the indirect process.

In concluding, I would like to mention the following, which is of interest scientifically and, perhaps, on our largest plants, commercially. The complete analysis of a few samples of rich oil taken on its way to the benzol still shows a varying, but large, percentage of cyanogen and sulphuretted hydrogen; proving that creosote oil has the property of dissolving these gases. The rich oil treated at the benzol plant is not only stripped of low-boiling hydrocarbons, but also of cyanogen and sulphuretted hydrogen, which permanent gases, being uncondensed, pass away from the vapour pipe attached to the benzol condenser.

The report of the discussion is (through the "JOURNAL" going early to press on account of the holidays) held over until next week.

Accidents and Light Curtailment.

In a paper read before the Illuminating Engineering Society of America, reference was made to the statement of the Travellers' Insurance Company of the United States, which was noticed in a recent issue of the "JOURNAL" [*ante*, p. 425], that a survey of 91,000 accidents from their records for the year 1910 showed that 23·8 p.ct. were due to either improper or inadequate illumination. Admitting that there has been great progress in the art of illumination in the meantime, it was said that there is nevertheless some foundation for assuming that 18 p.ct. of the industrial accidents in the United States are due to defects in lighting installations. On this basis, the services of 108,000 men for one year are lost annually because the illumination provided is not adequate for the safety of the workers. The elimination of accidents due to inadequate or improper lighting is simply a matter of purchasing approved equipment and installing it under competent direction. The money involved is insignificant, when compared with the accident claims, or the lost profit on the product of the labour, or the value of the product itself. Anyone making an extended survey of the lighting conditions in industry will inevitably be impressed by the much larger percentage of improper installations than of inadequate ones, because of praiseworthy but ill-advised attempts to better the plant illumination on the basis solely of providing a greater candle-power output. The questions of distribution, diffusion, and absence of glare are either not fully appreciated, or are entirely unknown, and thus do not receive proper consideration. The saving in coal by the curtailment of industrial lighting would be negligible when compared with the ultimate economic loss. If the full year's labour of the 108,000 men that is lost annually, due to poor illumination, could be saved and applied to coal mining, 130,000,000 tons more coal could be produced. To provide ample illumination for the safety of all these workers ten hours a day for a full year would require less than 10,000 tons of coal. Looking at the matter in another way, a 25-watt lamp burning ten hours a day will provide adequate illumination on a stairway for one year by the use of one-eighth of a ton of coal. By dispensing with the lamp, one-eighth of a ton of coal will be saved; but if during the year one accident occurs involving the loss of only one day's time, the economic loss from a coal-producing standpoint would be sufficient to operate the lamp for 32 years.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Yorkshire Commercial Section and Mr. Charles Carpenter's Letter on Benzol Extraction.

SIR,—It is to be regretted that the Yorkshire Commercial Section has seen fit to rush to the Technical Press with a resolution deploring the action of Mr. Carpenter, anent washing gas for benzol, without first of all proving or giving proof that benzol extraction is beneficial alike to the gas industry and its customers.

The present writer long ago experimented with "stripped" gas—using all kinds of washing fluid—when developing his maximum-light standard Argand burners; and, quite apart from the requirements of present-day use, he found by the research that denuded gas was inferior to a non-washed gas of equal gross calorific value. The wash-oil, especially creosote, removes other gases than benzol, and at the same time robs the gas (when burnt) of that vital requirement—flame volume—so necessary for satisfactory performance in a mantle, and especially in a gas-fire. Its volume is little, as indicated by analysis, yet much depends upon its presence in obtaining satisfaction or preventing complaint of bad gas from customers. The gas industry cannot to-day afford to ignore the requirements of its patrons, be their gas bills large or small.

I strongly advocate a non-washed gas of 500 B.Th.U. gross as a minimum, since this will allow of a more remunerative and economical make of gas per ton of coal, with less worry than a washed gas which carries with it dissatisfaction and ultimately a dearer gas with less customers.

I do not intend going into the pros and cons of benzol extraction, but will only add that washed gas has an increased gravity of about 10 p.ct.; and therefore, the pressure must be increased to produce the required increase in the rate of efflux in order to yield the same heat units (but not the same effective results) at the point of duty—*i.e.*, at the burner. It resolves itself into this, whether it will be better to sell benzol or an extra 1000 or 2000 c.ft. of gas. I venture to say the gas will yield at least five or six times more revenue, and carry with it satisfaction, if the benzol be left in the outgoing gas.

This then is the step to take in order to reduce the selling price, and is in the best interests of the gas industry generally.

Glasgow, Dec. 14, 1918. W. GRAFTON.

[Is there not something wrong with Mr. Grafton's statement that "washed gas has an *increased* gravity of about 10 p.ct." We can understand that an additional nitrogen content increases the specific gravity of a town's gas, but that the specific gravity of a gas, after the removal of the benzol, increases 10 p.ct. is not so readily appreciated.—ED. G.J.]

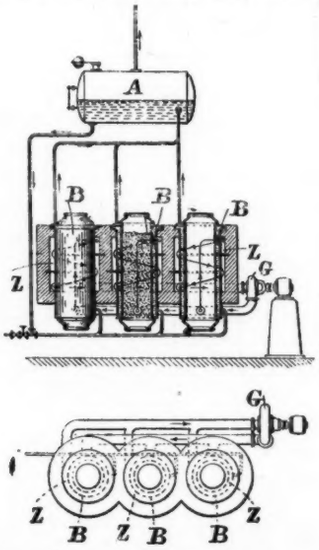
REGISTER OF PATENTS.

Cooling Hot Residues from Distillation Processes. No. 120,329.

KILBURN, B. E. D.; a communication from SULZER FRÈRES, SOC. ANON., of Winterthur, Switzerland.

No. 3997; March 7, 1918.

This invention relates to the cooling of hot residues from gas or coke works; the heat withdrawn being used simultaneously for the generation of steam or for other purposes. The cooling is effected by air contained in an airtight apparatus—the air, after giving off its oxygen to the residual material, being circulated through the cooling apparatus by means of a blower.



Sulzer Bros' Apparatus for Cooling Coke Residues, &c.

One construction of plant suitable for carrying out the process is illustrated diagrammatically in part sectional elevation and plan.

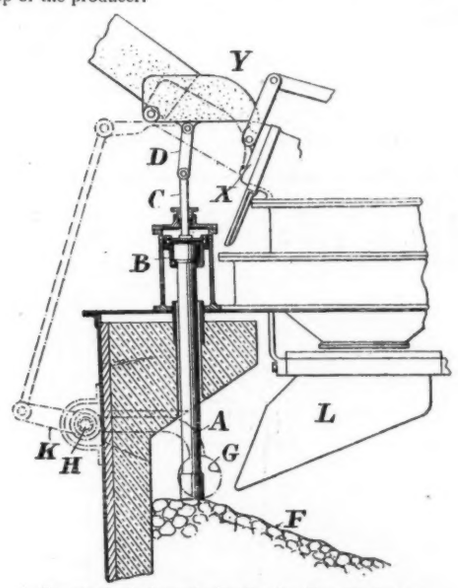
The process is carried out in the following manner: The residual material (say) coke, in an incandescent state, is deposited in the vessels B, and the doors above are closed. The blower G is then put into operation, with the result that the air contained in the apparatus is forced through the incandescent coke, whence it passes through openings into the flues Z—over baffle-plates, and in contact with the outer wall of the jackets of the chambers; so that the heat taken up by the air passing through the coke is transferred in the flues to the water contained in the jackets. When the air first passes through the incandescent coke the oxygen, which is present in relatively small proportion, in the air will at once combine with a part of the coke to form CO and CO_2; but as the admission of fresh air is excluded from the closed circuit during subsequent circulation of the air, the oxygen will no longer cause any loss as a result of its action on the coke. The difference of temperature between the two exchange bodies gradually decreases; so that, unless some other action takes place, the quantity of heat transferred per second to the water would also gradually decrease. To prevent this decrease in the rate of transference, and in order to maintain the supply of heat to the water as constant as possible, the speed at which the air is circulated by the blower is so regulated that the quantity of heat per second transferred by the air from the coke and supplied to the walls of the jackets remains constant in spite of the decreasing temperature of the coke.

Feeding Fuel to Gas-Producers.—No. 120,853.

THUMAN, F., of Victoria Street, Westminster.

No. 7532; May 4, 1918.

This invention has reference to apparatus for feeding material into gas-producers, ovens, cupolas, or retorts wherein the feed is controlled by power-driven valves or similar devices. Patent No. 116,445 relates to apparatus of this kind; and the inventor points out that, in the case of a gas-producer, to which the arrangement is especially applicable, if the rate of feeding be greater than the rate of combustion taking place in the fuel bed, there is an accumulation of fuel, which in time fills the producer completely, and, if a spreading device is used, would so interfere with its free operation that the operator has to inspect the fuel height through a sight cock, or through a sounding hole in the top of the producer.



Thuman's Automatic Feeder for Gas-Producers.

The illustration is a part sectional elevation of a producer feeding arrangement comprising a cam controlled slide-valve controlling the inlet to the feed chamber and a movable spout leading to, and actuated in conjunction with, the valve as described in the earlier patent, and provided with one form of means for checking the flow of fuel to the feed chamber when the level of it in the producer exceeds a predetermined height.

X is the slide valve connected by links to the cam actuated lever. Y is the movable spout at the end of the fuel feed shoot. The spout overlaps a projection on the valve so as to be raised to the position shown by the upward movement of the valve, and thus stop the flow of fuel from the shoot. A is a sounder, made of refractory material and passing through the top of the producer. It is suspended in a cast-iron socket B attached to a rod C, and is connected at its upper end by a link D to the bottom of the movable feed spout Y. So long as the top surface of the fuel bed is at a level to allow the sounder to descend freely, the spout is free to descend by gravity when the inlet valve X is in its lower open position. If, however, the level of the fuel ascends to the fixed maximum height indicated at F, the sounder rests upon the surface of the fuel and prevents the spout descending, even though the valve X is moved in its usual routine to the open position. The parts of the feeding arrangement continue to operate in the usual way, though no fuel (or only a restricted amount) passes into the producer until the consumption has lowered the upper surface of fuel to a level where the sounder is again free to descend to such an extent as to allow the spout to drop to the position in which the fuel from the shoot can flow freely into the hopper.

The dotted lines indicate a modification in which a sounder G (also of refractory material) is carried by a lever arm passing through the

side of the producer and fixed to a rock shaft H, another external arm K on which is connected to an arm projecting from the spout. This arrangement acts in the same way as that already described to check the flow of the fuel when required.

Such arrangements for automatically controlling the rate of feeding the fuel ensure that it can never reach a height where it would choke the producer or interfere with the running of the spreader L and feeding apparatus.

Fractional or Destructive Distillation. No. 120,854.

TURNER, C., of Irlam, near Manchester.

No. 8011; Nov. 23, 1917.

In his provisional specification No. 8743 of 1917 the patentee described an invention consisting in distilling carbonaceous materials—such as peat, lignite, oil-shale, oil-impregnated material, or coal—in a vessel the pressure in which is alternately raised and lowered. In the specification the material was, it was pointed out, heated by passing through it a heating current of steam or of gas which does not support combustion, or of a mixture of steam and such gas, superheated to the requisite degree. He has, however, since found that processes of fractional or destructive distillation generally are advantageously conducted in a vessel which is alternately closed until the pressure in them has been raised to a desired maximum and then opened, whereby the pressure falls rapidly from the maximum solely by expansion. The advantages which accrue are said to be independent of whether the heating of the vessel be internal or external.

Measurement of Gas to Gas-Bags forMotors. No. 120,804.

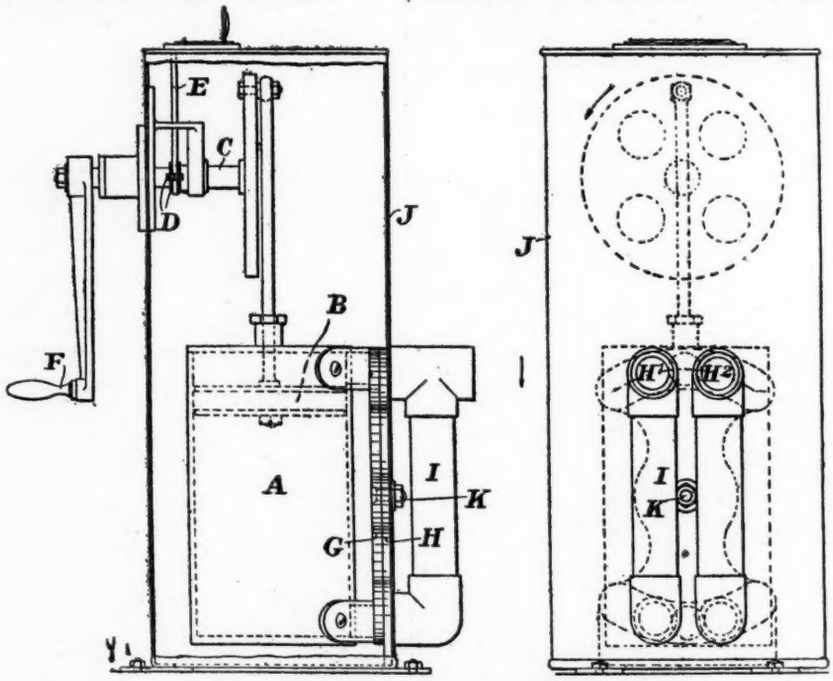
PARKINSON, W. W., and PARKINSON AND W. & B. COWAN, LTD., of Cottage Lane Works, City Road, E.C.

No. 18,373; Dec. 11, 1917.

This invention has for its object to charge motor gas-bags or containers "quickly, without dependance upon the existing pressure in the mains, and to register correctly the amount of the charge."

A side and rear elevation are given of the pumping apparatus suggested for measuring and delivering gas constructed according to the invention.

A cylinder A (of oscillating type), formed of rolled tin plate, has a double-acting piston or plunger B mounted to reciprocate in it. The piston (also made of tin plate with a packing of oiled felt) is enclosed in leather and expanded by radially acting springs in radial guides behind the packing. The piston rod, passing through a stuffing-box on the top of the cylinder, is connected at its upper end with a crank pin carried by a balanced crank disc on a crank shaft C, and in a stuffing-box fixed inside and outside the cylinder respectively. The shaft is geared by worm gear D and a spindle E, with an index to register the gas supplied—this being dependent upon the volumetric capacity of the pump chamber, which is capable of being regulated, as in an ordinary dry meter, by adjusting the length of the crank.



Parkinson's Motor-Car Gas Supply Arrangement.

The dimensions of the cylinder and the stroke of the piston are (say) such as to give a capacity of ½ c.ft. per stroke or 1 c.ft. per revolution of the crank-shaft. Thus at least 60 c.ft. of gas per minute can be passed.

A handle F on the end of the shaft enables the piston to be operated independently of the gas pressure, and worked as a pump to increase the delivery. For controlling the flow of gas to and from the cylinder, a cast plate G is fixed to the cylinder so as to oscillate with it. At each end of the plate is an opening in communication with the interior of the cylinder; the openings acting alternately as inlet and outlet. Co-operating with the plate G, which acts as a valve, is a cast-iron plate H, formed with inlet and outlet ports or openings at each end connected by inlet and outlet pipes with the gas supply-main and delivery pipes. The plate H is fixed to a gas-tight casing J; while the oscillating plate G and the cylinder A are pivotally supported against the plate by a pivot bolt K.

In operation the handle is turned to rotate the crank in the direction of the arrow—back stops (not shown) being arranged to operate on the crank to prevent rotation in the reverse direction. In the position shown in the back elevation, the piston is at the top of its up-stroke; and during its descent it oscillates the cylinder so as to bring the openings at opposite ends of the cylinder into register with the upper inlet port and the lower outlet port—gas being drawn in above the piston and discharged from below it. Likewise as the piston ascends, the cylinder is oscillated in the reverse direction to put the lower inlet port and the upper outlet in communication therewith.

Incandescent Gas-Burners.—No. 120,858.

SCHROEDER, F. W., of Kennington Road, S.E.

No. 8579; May 23, 1918.

This invention relates to inverted incandescent burners furnished with means for confining as much as possible the heated products of combustion within the interior of the mantle, "in order that the heat may be utilized in increasing the incandescence and so producing greater brilliancy of light."

Schroeder's Incandescent Gas-Burner.

The nozzle-piece is made of porcelain of "massive proportions," in order to retain the heat. It consists of two integrally formed portions of circular transverse sections; the upper portion being upwardly coned and arranged to project beyond the lower portion of smaller size and tapering downwardly. The upper portion is internally screw-threaded for attachment with the mixing-tube, and is provided with depending integral lugs. The mantle holder is formed with upwardly and outwardly extending lugs, and is devoid of internal projections. Its inner diameter is such that the holder will fit closely around the lower nozzle portion when the holder is fitted to it, so that the lugs rest upon each other. In order that "the heated gases of combustion may escape slowly from the space within the mantle in the form of a number of streams equally distributed around the nozzle piece, and thereby heat the latter, and that the pressure within the said space may be prevented from becoming too great," a number of shallow corrugations, equally spaced, may be formed along the inner peripheral surface of the holder.

LEGAL INTELLIGENCE.

AN AGREEMENT AS TO GAS CHARGES.

Royston Urban District Council v. Royston (Yorks) and District Gas Company, Ltd.

In the Chancery Division of the High Court of Justice on Friday last, Mr. JUSTICE YOUNGER had before him the above action, arising out of an agreement as to the charges for gas.

Mr. MACMORRAN, K.C. (with him Mr. TURNER), said he had to apply for an injunction to restrain the defendant Company from charging to the plaintiffs, or to private consumers, in the township of Royston, for gas supplied a price exceeding that prescribed by an agreement of March 8, 1904, which was entered into between the Council and Mr. Henry Ellison.

Mr. MATTHEWS, K.C. (with him Mr. J. G. WOODS), for defendants, said he did not think the Court could deal with this matter upon motion, and suggested that there should be an early trial of the action. In the meantime plaintiffs need not pay more than they thought right; but the more serious point was whether plaintiffs were entitled to restrain defendants from increasing the price for gas supplied to private consumers. He thought the right thing to do was for defendants to keep an account under this head, and let the motion stand till the trial. He did not see how it was possible to deal with the case upon motion, and, moreover, he was not in fact charging more for gas than he was entitled to under the agreement.

Mr. MACMORRAN said the difficulty of letting the case stand over was that the accounts for the December quarter would be sent out before the question was disposed of. The agreement regulated the charge to be made for public lighting and to private consumers. It was all very well for defendants to say that the Council should pay 3s. instead of 4s., and that they need not pay more; but the agreement provided that the Gas Company should charge a specified rate, and they were now seeking, by inserting notices in the Public Press, to increase the prices. He asked for an injunction restraining defendant Company from charging private consumers any sum higher than that mentioned in the agreement.

Mr. JUSTICE YOUNGER doubted whether plaintiffs had any right to complain of private consumers being charged more, and suggested that the motion should stand till the trial, when the whole question could be disposed of.

Mr. MACMORRAN admitted that it would be difficult to dispose of the case on an interlocutory motion.

Mr. JUSTICE YOUNGER thought plaintiffs were entitled to an injunction restraining the defendant Company from charging the Council more than the agreement stated, and suggested that the defendants should give an undertaking pending the trial not to do so.

Mr. MATTHEWS said he was quite willing to do so.

Mr. JUSTICE YOUNGER ordered the motion to stand till the trial, and gave liberty to apply to fix a date for an early trial.

Responsibility for Unlighted Street Standards.

The Court of Appeal last week, without calling upon Counsel for the respondent, dismissed the appeal of the Westminster City Council against a decision of the Divisional Court setting aside a County Court judgment in an action brought by a taxicab owner named Baldock for an accident which arose under circumstances fully reported in the "JOURNAL" for Nov. 12 last [p. 376]. The action was for alleged negligence on the part of the defendants in failing to have a street refuge at Cockspur Street, Westminster, properly lighted, and in not supplying a suitable lamp for the refuge. There was a lamp; but on the night of the accident it had gone out, and the Jury found there was negligence on the part of the Council. The Deputy County Court Judge, however, entered judgment for the defendants, on the ground that there was no evidence that the particular lamp had gone out before the night of the accident, or that the defendants knew that it had gone out or was likely to go out. He held that it would be unreasonable to say the defendants were bound to provide against the contingency that a particular lamp might go out. Lord Justice Bankes, in the Court of Appeal, said it was open to the Jury to take the view that the defendants were negligent in the case of that particular lamp on that particular refuge on that particular night. There was evidence on which they could so find.

Labour Shortage at Teignmouth.—Inability to secure stokers is stated to have been, along with poor quality coal, the cause of "repeated partial failure of the gas supply" at Teignmouth. The matter was referred to at the last meeting of the Urban District Council, when Mr. French declared that the difficulties experienced had not been the fault either of the late or of the present Manager. However, one or two stokers have now returned; so that, said Mr. H. Higham (the Manager) "he did not think there would be any more failures of the gas supply before Christmas."

Edinburgh Gas-Workers' Wages.—The National Union of Corporation Workers having made a request for a further increase in the amount of the war bonus, representatives of the Edinburgh and Leith Gas Commissioners, the Corporation Electricity Department, the Edinburgh and District Water Trust, and the Leith Corporation met at the City Chambers on Wednesday last for the purpose of deciding upon common action. It was explained by the Convener of the Works Committee of the Gas Commissioners (Mr. Douglas Elliot) that negotiations were shortly to take place between the National Federation of General Workers (which included the great majority of English gas workers) and the National Gas Council, and it was suggested that the conference asked for by the Union of Corporation Workers should be postponed until after these negotiations had terminated. This was agreed to.

MISCELLANEOUS NEWS.

CONTINENTAL UNION GAS COMPANY, LTD.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, No. 7, Drapers' Gardens, Throgmorton Street, E.C.—Col. H. LE ROY LEWIS, C.B., C.M.G., D.S.O., in the chair.

The SECRETARY (Mr. Edwin C. Bode) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he would make a few remarks on the activities of the Company during the past year. When last he had the honour of addressing the proprietors (which was at the beginning of December, 1914), they were then on the threshold of the great war, which had now been so happily terminated. He need scarcely tell them that, in 1914, they were all full of anxiety as to what would happen to their Company; and, indeed, the whole future was so dark and troubled that it was with feelings of considerable dismay that he addressed the proprietors on that occasion. Four years had intervened since that date; and they were now—perhaps not at the end of their troubles, but still they could, he thought, see a little daylight before them. They had come victorious out of the greatest war the world had ever known, and the Company were now beginning to take stock, and to see what the future reserved in store for them. During those four years, they had been fortunate enough to secure for the management of the Company the services of his friend Sir George Touche; and he (the Chairman) thought that the debt which the Company owed to Sir George could never be repaid. He had great pleasure in bearing public testimony to the unflagging activity, zeal, and intelligence which Sir George had placed at the disposal of the Company, and which had enabled them to steer their somewhat frail barque through the terrible tempest through which they had all had to pass.

THE CONTINENTAL UNION ACCOUNTS.

He should like to say a few words as to the figures in the profit and loss account and the balance-sheet of the Continental Union Company. Of course, the proprietors all knew that the figures which affected the English Company were of minor importance compared with those which affected their French daughter, as she really supplied them with the sinews of war, and enabled them to pay a dividend when times were prosperous. It would be noticed that on the debit side of the profit and loss account the management and general charges were slightly less. The reason was that on the present occasion they had not to include in the accounts the testimonial which was given to their old and respected Secretary, Mr. Martin. Pensions in London and Messina were slightly less. There the Company benefited by the rate of exchange; and they were able to remit slightly more lire to Italy for the pound sterling. Income-tax had increased by £150, due to the higher rate. Foreign dividends suspense account had disappeared altogether. There was a debit of £3008 in the previous year; but there was nothing this year. The reason of this was that credit was taken in the 1914 accounts for the sum of £29,000, which was the amount of the dividend declared by the Union des Gaz, but never paid by them. Rightly enough, the Directors of that Company decided, in view of the terrible circumstances of the times, not to pay the dividend. The sum had been wisely written off year by year; and now it had been completely extinguished. The balance carried forward was £3846 more than last year, which was not an enormous showing, but still it was gratifying as being in the right direction. On the credit side of the profit and loss account, it would be seen that the dividends and interest received during the year were slightly less. This was more than accounted for by the increased income-tax that had had to be paid this year. Income-tax was considerably less, diminishing from £1030 to £489. The reason of this was they had had two years repaid to them by the surveyor of taxes on a claim the Company made. This was not likely to appear again. The sundry receipts only exhibited a trifling difference. In the balance-sheet, sundry creditors and credit balances showed a diminution, which was largely accounted for by the fact that they held some £17,000 less for the Union des Gaz than in the previous year. The two items in the balance-sheet, sundry creditors and cash at bankers, loans, &c., represented the financial transactions that the Continental Union Company performed for the Union des Gaz in the purchase of coal and freights for Italy, so these were fluctuating figures which depended very much on the state of the cash balances of the Union des Gaz and the Continental Union Company at the time they were struck. They did not really call for much explanation, nor did they throw much light on their position. On the creditor side of the balance-sheet, it would be found that they had investments amounting to £1,001,656. The question would jump to the mind of every intelligent proprietor, "How much depreciation have you on that?" It was really quite impossible to say. They saw by the reports of most trust companies that valuations were very difficult to make. At the present moment, values were most uncertain; and the quotations seen in Stock Exchange lists were quite nominal. Still he had had as far as possible a valuation made of their various stocks; and if they took their large holding of Union des Gaz shares at their book value (which he might tell the proprietors was below the prices quoted in the Stock Exchange lists), they had on the whole of their securities a depreciation of not more than 3½ p.ct., which he considered was a fairly satisfactory showing. But he did not wish the proprietors to run away with the idea that this was a very reliable figure, because if they were to try to liquidate their vast amount of securities, it would be found there would be startling differences before they reached the end of the liquidation.

THE WAR DIFFICULTIES OF THE UNION DES GAZ.

As he had said before, the accounts of the Continental Union Company were really not of great interest to the proprietors, because the Company from which they drew the possibility of paying a dividend—the Union des Gaz—was the real point of anxiety to them; and now he

would call attention to a review of the four years' war activity of that great Company. He need hardly tell the proprietors it had been a time of most intense anxiety. The Company had suffered not only from those causes which were natural and germane to any company operating in a time of war—diminution of personnel, difficulty of effecting repairs, and such-like considerations—but there was one peculiar reason which had made the position of the Union des Gaz extremely difficult, and this was the fact that they were principally operating in a country in which not a single pound of coal was produced, and the whole of the coal, which was their raw material, had to be sent from England to Italy. This, with the intensive submarine campaign, the trouble of finding freights, and the higher rates of exchange, and other difficulties which had arisen had made their path by no means an easy one.

SOME REMARKABLE FIGURES.

The Union des Gaz had come out of this catastrophe in a way which, he thought, was somewhat remarkable. He wanted to call attention to a few figures which had been drawn from the accounts, and which would give the proprietors an idea of the difference of the war activities, compared with those of the pre-war period. For the year ending in 1914, the Union des Gaz sold 125 million cubic metres of gas. The last accounts they had showed a sale of 112 million cubic metres, or a difference of about 13 million cubic metres. This was a great falling off; but by no means so great as might have been expected. Receipts from gas increased very considerably—by no less than 9 million frs. The amount of coal carbonized decreased by 42,959 tons; and the total cost of the carbonization advanced by the enormous sum of 48 million frs. —nearly two millions sterling. Of course, higher wages and the higher prices for everything entirely accounted for this. On the other hand, they had had certain pulls. The bye-products—coke especially—had increased by no less than 35 million frs. However, when they came to look at a comparison of the present year with the year before the war, it was found that whereas the station's accounts showed at the end of the year 1914 a profit of 7 million frs., this profit had been changed into a loss of some 2 million frs. There was, he wished to tell them, one subject of considerable gratification to him; and one for which their friend, Mr. A. F. Phillips, must take a considerable amount of credit. Looking at the technical results, they found that, in spite of the great difficulties, the inferior quality of the coal carbonized, and so on, while they sold per ton of coal carbonized in the pre-war period 289 cubic metres of gas, in the war period there had been sold 287 cubic metres, which was a small diminution indeed. The gas produced in the pre-war period was 321 cubic metres per ton, against 318 cubic metres in the war period. This was a very satisfactory showing, considering the great difficulties with which they had had to contend.

COAL SHIPPING AND COAL PRICES.

He had briefly alluded to the financial and some of the leading technical figures which affected the Company; besides there were five principal causes which increased the great difficulties encountered by the Union des Gaz during the war: Coal and its price, freights, insurance exchange, and the possibility of financing the enormous demands which were made upon them. As to coal, the proprietors knew that the Italian Commission in London had undertaken to a very large extent the shipment of goods of prime necessity which would be required to keep Italy going during the war. He was happy to say that the Union des Gaz—one of the only companies in this position during the whole of the war—had been entirely independent of the Commission. During the four years of the war, they had used 1,140,000 tons of coal in Italy, and the Company itself had shipped no less than 950,000 tons of that coal, which was very remarkable indeed. He hoped, when the time came to consider their contracts in Italy, and various delicate questions they had now outstanding with the Italian Government, that the Italian authorities would not forget the help which was rendered by the Union des Gaz to them by not calling for any extra tonnage upon ships which were assigned to the use of the Italian Government. Of course, if they had not been ably seconded here in England, they would not have been able to show such good results. He should like the proprietors to know that most of these good results with reference to the shipment of coal had been attained by the devotion, energy, and ability which their agents had put into this business. Without this help, certainly they would not have been able to make such a good showing as they did that day. The Company not only carried this vast amount of coal out to Italy, but they did their little bit for this country by conveying no less than 240,000 tons of ore, principally from Spain, back to this country to be made into munitions. So the voyages not only supplied the population of Milan and Genoa with gas, and the munition works of Italy with certain bye-products for making explosives, but they contributed to the manufacture of munitions in this country by providing no less than 240,000 tons of ore, which was not a bad showing. As far as the price of coal went, before the war the average was something like 12s. to 14s. per ton f.o.b.; in 1916, it rose to 35s., when it was reduced to 25s.; but it was again increased in 1918 to 32s. These figures on the large amount of coal used made a perfectly terrible showing on the financial side, and demanded an increase in the turnover of money to an enormous amount.

FREIGHTS AND INSURANCE—THE SINKING OF A SUBMARINE.

The second great difficulty he referred to was freights. If coal had increased in price, freights had risen to something prodigious. The pre-war average for freights was about 8s. per ton. It rose gradually to 44s. in March, 1915; but in December it increased to 66s. In May, 1916, it reached 100s. per ton; falling in November, 1916, to 70s., when by arrangement between the Allied Governments, the rate to Genoa was fixed at 64s. 6d. There was rather a considerable difference between 8s. before the war and 64s. 6d. at the present moment. Insurance was another item which increased gigantically. The pre-war rate for insurance was about 10s. p.ct. In 1915, it had increased to 26s.; and in 1916, to 55s. By December, 1916, it was 105s. In 1917, owing to the intensive submarine campaign, it increased to no less than 210s. p.ct.; and, in January last year, to 168s. p.ct. These were fearful figures, which would explain very largely one of the difficulties which he must allude to presently. Of course, this increase of freight and insurance showed the dearth of boats and the war necessities of the Government; and they also reflected a condition of things which must not be overlooked. That was the intense danger of navigating the seas during the time of war. Had it not been for the wonderful services of the mercantile marine during the war, it would have been impossible to ship any coal at all from this country to Genoa; and to think that a body of men were so actuated by a sense of duty as to sail the seas with intense dangers about them, in order to provide Italian consumers with gas, was to him a most remarkable consideration. The First Lord of the Admiralty told them the other day there had been during the war no less than 3145 boats sunk beneath the feet of the sailors of the mercantile marine; and the number of men killed in the mercantile marine had been no less than 18,000. These were gigantic figures; and they showed the sense of duty and the stout hearts that all the mercantile marine sailors had. The Union des Gaz had contributed to a certain extent to swell the total of these figures. During the war their cargoes were carried by twenty-two boats. Sixteen of these were torpedoed. So he thought a very large share of the casualties fell upon their unfortunate Company. But if they were unfortunate in losing boats, they were fortunate enough to cause the disappearance of one submarine from the German fleet. Of course, this was not generally known, because a great veil of secrecy surrounded all the operations against submarines—and quite right too. It was a most remarkable thing that a cargo steamer should have been able to sink one of the most modern of German submarines. The whole thing was carried out by the stout hearts of the skipper and crew; and they, at this City meeting of theirs, ought to address their hearty congratulations to him. The Directors, on behalf of the Company, had already presented him with a gold watch. He (the Chairman) believed Mr. Thompson was still living; and they all wished him long life and continued prosperity.

THE RATE OF EXCHANGE, AND A HEALTHY FINANCIAL POSITION.

Turning from these more breezy doings of the sea to the Company's more prosaic difficulties, the fourth difficulty he had to mention was the rate of exchange. It was enormously against them in Italy, and affected their finances very largely. The takings in Italy were being received in lire, which had to be transformed into pounds sterling in England, in order to pay for coal and freight. The exchange fluctuated between 25·50 and 28 in 1914; but in 1918, it rose as high as 39·80 to 45·65, which made a very great extra demand upon them. The same could be said of their financial requirements (to which it was the duty of the Continental Union to attend), they increased somewhat in this proportion; whereas before the war it was necessary to find a sum of something like £5000 to finance an ordinary-sized steamer to go to Genoa, during the war the amount increased to from £30,000 to £40,000 on each cargo. So the proprietors could imagine what difficulties the Directors had had to face. He rather fancied that during the period of the war, his friend Sir George Touche had, merely for the financing of coal cargoes, to spend a sum of money of something like 7 to 8 millions sterling. How he managed to find the money without encroaching upon the Company's credit was a perfect wonder to him (the Chairman). But it had been done, and perfectly successfully. For in spite of all difficulties, they had managed to pay their way; and the financial situation was that they did not owe a single sixpence to their bankers. They had not increased their liabilities in any way during the war. It was perfectly true the profit and loss account of the Union des Gaz for the four years showed an accumulated loss of 12 million frs.; but this accumulated loss was made after providing for the payment of obligations and all proper amortization charges. The only thing (though provided for in the accounts), he might say, which had not been paid for in cash was the redemption of their obligations; but this only amounted to about 4 million frs., or £160,000. At this moment, their position, so far as the liquid assets were concerned, was an excellent one. It must, however, be fully realized that during this period of four years of war, very little work had been done on their plant; and the stocks of coal had reached a very low level. Therefore their healthy financial position was a great godsend to them, for they would, without a doubt, have to spend large sums of money in putting their works into a proper state of repair, so that they might, he hoped, resume dividend paying at no distant date.

AND AS TO THE FUTURE.

What the immediate future of the Union des Gaz might be, it was difficult to foretell. They had certain very delicate questions to settle with the Italian Government. They had, as he had said, large amounts to provide for repairs and renewals on their works; and there was no doubt in his mind that they had yet one more year—from June, 1918, to June, 1919—in which their showing would not be particularly brilliant. But taking into consideration all the different circumstances, it seemed to him the outlook of the Union des Gaz was by no means a bad one; and the time might yet come in which that Company would regain a considerable amount of prosperity, which it only lost during the war. If this was the case, the proprietors of the Continental Union Company would be the very first to benefit by the increased measure of prosperity that accrued to the great French Company.

The DEPUTY-CHAIRMAN (Mr. Arthur Lucas) seconded the motion.

Mr. C. P. CROOKENDEN referred to the interesting character of the speech delivered by the Chairman; adding that the proprietors congratulated themselves upon seeing Col. Le Roy Lewis once more in the chair.

The motion was unanimously carried.

RE-ELECTIONS.

The CHAIRMAN moved the re-election to the Board of Sir George Touche and the Rt. Hon. Sir Edward Goulding, Bart.

Sir HENRY BIRCHENOUGH, K.C.M.G., in seconding, remarked that he should like to say on behalf of those who had sat under Sir George Touche on the Board during the enforced absence of the Chairman on public duty, how much they appreciated his competence and ability, as well as the courteous consideration which he had shown to his colleagues on all occasions.

THE SHIPPING OUTLOOK.

Sir GEORGE TOUCHE, replying on behalf of himself and Sir Edward Goulding, thanked the Chairman and Sir Henry Birchenough for the

very kind remarks they had made concerning himself. He felt they had given him credit for much more than he deserved. It would have been quite impossible to have come through the difficult times through which they had been passing with the success that had attended their efforts if he had not had the most capable and loyal co-operation of his colleagues on the Board, as well as of every member of the staff, together with the devoted assistance of their French colleagues of the Union des Gaz. Even during the period of the war, they had not been altogether out of touch with their Chairman; and, in an indirect and informal way, they got a good deal of assistance from him. No one rejoiced more at seeing his return than he (Sir George). There were great difficulties ahead, and delicate matters to be adjusted; and there was no one more capable of conducting negotiations that might be necessary than their Chairman. The proprietors had heard what had been achieved on the matter of shipping. He (Sir George) believed this difficulty was going to disappear more rapidly than most people expected it would. There would soon be a great reduction of the requirements of the Government—for example, the carrying of munitions to France would no longer be necessary. Then again the total loss of cargo tonnage and British merchant shipping during the war had been about 9 million tons, while replacements by new construction amounted to 5¾ million tons; and this with enemy ships captured, and ships bought, showed a net shortage of about 3¼ million tons. The British programme for building during next year would give about 3 million tons more. The American programme was for about 10 million tons. How far this would be carried out, he did not know; but certainly there would be an enormous addition to the shipping tonnage. Besides, there would be the Japanese, Norwegian, and French additions. Therefore he looked forward with great confidence to an improvement in the shipping situation.

Proposed by Mr. G. FURNESS, and seconded by Mr. BERNARD F. HARRIS, the Auditors (Messrs. A. T. Eastman and C. P. Crookenden, F.C.A.) were re-appointed.

VOTES OF THANKS.

The CHAIRMAN, in moving a vote of thanks to the members of the staff in London and to all working on the Continent, spoke of the enormous difficulties with which they had had to contend, and expressed to them the deepest sympathy of the proprietors, and congratulations on the success of their efforts.

Mr. A. F. PHILLIPS, in seconding, also spoke of the great devotion to duty that had been shown by all the officers and the staff not only of the Continental Union Company, but of the Union des Gaz.

The motion was heartily carried.

Proposed by Mr. CROOKENDEN, and seconded by Mr. FURNESS, a cordial vote of thanks was passed to the Chairman and Directors.

COLONIAL GAS ASSOCIATION, LTD.

Another Record Balance-Sheet.

The Ordinary General Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. SAMUEL SPENCER in the chair.

The SECRETARY (Mr. A. J. Kingdon) read the notice convening the meeting, and the report of the Auditors; and the Directors' report and the statement of accounts for the year ended June 30 were taken as read.

The CHAIRMAN, on rising, said he was sorry the meeting on this occasion was somewhat later than had been hoped to call it; but the delay was unavoidable, as it was necessary to cable twice to Melbourne, which occasioned the loss of a fortnight, as the delivery and reply took some five or six days. It was with much pleasure that the Board again found themselves in a position to report another record balance-sheet, which they felt confident the shareholders would have received with satisfaction—considering the very anxious financial year that had been passed through, up to the end of June last. The result of the working was a sale of 253¼ million c.ft. of gas, which was an increase of 12 p.ct. over the previous year. Notwithstanding this increase, it could have been considerably more, if the Company had been able to make the extensions to the works that were so much required. However, they had to do the best they could; and great credit was due to the Local Directors and Managers that such a satisfactory result has been achieved. The three Melbourne works, which were the Company's largest, did remarkably well; and as soon as the difficulty was met of obtaining supplies, they would show big increases which would be in every way beneficial to the consumers and to the Association. Coal had cost some £6000 more than in the previous year—partly through the coal strike during the first six months, which caused the management a good deal of anxiety, and expense through having to move coal from one works to another. Fortunately, they were able to do this, as they had fairly large stocks at some of the stations; and this enabled them to keep up the supply of gas from all the works. Wages, repairs, maintenance, depreciation, and general expenses were £2500 more, which naturally occurred through the larger quantity of gas made and supplied. All these increases were of a satisfactory nature, as they helped to produce the excellent balance-sheet now presented to the shareholders. They would no doubt have noticed that the result was £11,192 more received for gas and residuals than in the previous year, and some £2630 more carried to the credit of the revenue account. Before arriving at the balance of £16,436 on the revenue account, £2520 had been written off for depreciation. The sum of £627 was added to the reserve fund, and £4597 transferred to the renewal fund—being a provision towards the cost of carrying out repairs and replacements as soon as they could be undertaken. The revenue account showed, from all sources, every reason to be pleased with the result of the past year's working; and the same could be said with regard to all the figures in the balance-sheet. It would be noted with much satisfaction that the bank overdraft had been reduced by £7000; and at the date of the balance-sheet stood at £4038. This, he was glad to be able to tell them had been reduced on the 20th of last month to £2358, and the temporary loans reduced by £1250. During the year, 606 more meters were fixed, bringing the number up to 12,838. The average make of gas per ton of coal at the Company's fifteen works was 12,549 c.ft., and the sale 11,168 c.ft., with 9·32 p.ct. of unaccounted-for gas. The capital expended per million cubic feet of gas sold, the Directors were pleased to report, was now down to £967. For the past few years they had been hoping to get this below £1000; and they were delighted to be able to announce this result, which must be considered, by all connected with gas undertakings, a remarkably low figure for Colonial works. It would be noticed, in the balance-sheet, that the sundry creditors were about £9000, and that the amount owing to the Company was nearly twice this sum; while the coal stocks were over £16,000. The cost of the coal was 30s. 6d. per ton, or some 2s. 11d. more than last year. From the report, the shareholders would see that the Directors recommended a dividend of 6¼ p.ct.—a small increase over last year; and, after paying this, the carry forward was augmented by £1000, to £3000. In conclusion, he would like to mention that there were about 11,000 £1 preference 7 p.ct. shares which the Directors would be pleased to issue at par, to shareholders or their friends. Now that things were beginning to get back to normal times—excepting the high prices of what the Company required—the Board could with advantage make use of the money, spending it only with the greatest care in the best interests of the Association. Some of the shareholders had been asking to be allowed to increase their holding of preference shares to level amounts; and this the Board would be very glad to do. He was sure the shareholders would wish to join with the Board in sending out their best thanks to the Melbourne Directors, Works Managers, and all who had worked with them so loyally in producing this very excellent and satisfactory balance-sheet. He moved that the report and accounts be adopted.

Mr. CHARLES HUNT, in seconding the resolution, remarked that the Chairman had dealt so fully with all the salient points in the report that it was unnecesary to add anything, except to express his opinion that all connected with the undertaking were to be congratulated upon the improved financial position.

The motion was put to the meeting and (without discussion) carried unanimously.

The Hon. Sir JOHN W. TAVERNER, K.C.M.G., proposed that a dividend be declared at the rate of 6¼ p.ct. per annum (less income-tax), on the ordinary shares, for the year ended June 30 last. He said the shareholders all knew the serious times that had been gone through—things had been as bad in Australia as in this country—and they were very much indebted indeed to the management on the other side, for the way in which they had contended against all difficulties and produced these satisfactory results. They would also be glad to know that the Company's Footscray purchase had proved a magnificent speculation. Each year had been showing an increased supply; and the results were in every respect most gratifying. He wished they could buy a few more "Footscrays;" but they had done so well out of this one that he was afraid another opportunity would not occur.

Mr. F. R. SMITH seconded the proposition, which was agreed to.

On the motion of the CHAIRMAN, seconded by Mr. H. KING HILLER, the retiring Directors (Messrs. Samuel E. Figgis and F. R. Smith) were re-elected. The Chairman remarked that Mr. Figgis was their Managing Director in Australia; and the Company had been very fortunate indeed in securing his successful services. He hoped both Mr. Figgis and Mr. Smith would remain on the Board for a long time to come.

Moved by Mr. W. CHAFFER, seconded by Mr. C. HOLMES HUNT, the Auditors (Messrs. Wood, Drew, & Co.) were re-appointed.

Sir FREDERIC J. PAINTER proposed a hearty vote of thanks to the Directors and to the Managers in Australia. They must, he said, all be delighted with the balance-sheet that had just been submitted, as it showed, in these bad times, very great progress. Nothing could be more pleasing than to see the reduction in the heavy liabilities. The bank overdraft had almost gone; and the Board were also very wisely starting a renewal fund. Though they had not been able to spend much money, it was a sound policy to provide it, so as to be able to use it when opportunity offered. No doubt they were all highly gratified with the results; and one remark which the Chairman had made they should take particular note of—that relating to the issue of preference shares. He (the speaker) could not imagine a better investment than a 7 p.ct. preference share in a gas company paying 6¼ p.ct. on its ordinary shares. It would, he thought, be quite safe for all of them to invite their friends to invest.

Mr. A. SAWARD, in seconding, expressed the opinion that they ought all to congratulate themselves most heartily. What had been said that day gave great hopes, not only for the maintenance of the present dividend, but also for further expansion in the future, in addition to placing the Association on a thoroughly sound financial basis. This was what, in these times, they had to look to. It was a great pleasure, in investing in this Company, to know that he had a good concern at the back of him.

The vote was passed, and acknowledged by the CHAIRMAN.

Automatic Lighting at Leeds.—The automatic street-lamp lighting system, which was brought into use in some of the Leeds districts before the war, and which, on account of inadequate pressure of gas, had to be discontinued when the acute shortage manifested itself, is to be re-instated as early as practicable. The war has undoubtedly been the cause of the whole of Leeds streets not being lighted on this labour-saving system. The completion of the installation in the city will take some considerable time.

Coal Rationing and Gas Prospects.—Regarding the people who are heedlessly burning their rations under the mistaken, but rather prevalent, impression that the coal trouble is over, Sir Guy Calthrop remarked, in a statement made last week, that these householders were bound to suffer ultimately. There would be no relief from rationing this winter; but rationing would cease the moment it could safely be done in the national interests. It might be that the first effects of more abundant supplies of coal would be to permit of the supply of more gas and electricity.

BRITISH COALITE COMPANY, LTD.

The Ordinary General Meeting of the Company was held last Wednesday, at the Great Eastern Hotel, E.C., under the chairmanship of Mr. W. J. FISHER.

The report submitted dealt with the twelve months ended Sept. 30, and stated that during the year the affairs of the Company have made satisfactory progress. The plant of the Barnsley Smokeless Fuel Company, Ltd., at Barugh, which is under the management of Low-Temperature Carbonization, Ltd., has continued at work with good progressive results, and has fully justified the faith in the process. It is hoped, however, to improve considerably on what has already been achieved; and to this end, the plant is being very largely used for experimental purposes. Good prices have been obtained by Low-Temperature Carbonization, Ltd., for all products—especially for the coalite and the tar; the former having been sold at an average price of about 40s. per ton at the works, while the tar has realized a much higher figure than was estimated. The Company's interest in the Barnsley Smokeless Fuel Company has been still further increased. The agreement between the Company and Low-Temperature Carbonization, for the exploitation of the Company's process throughout the United Kingdom was signed on July 16. Under the terms of the agreement, the British Coalite Company have received £9000 to date.

The CHAIRMAN, in moving the adoption of the report and accounts, said the balance-sheet showed a very considerable improvement on its predecessor; and he hoped it might now be stated that they had passed beyond the region of promise into that of performance, so far as proving the practicability of the process was concerned. They would commence to reap the fruits of this when their Managing Company—Low-Temperature Carbonization, Ltd.—began to pay the agreed royalty of 1s. per ton upon an annual minimum of 700,000 tons of coal carbonized. Meanwhile, between the present date and February, 1920, they were to receive from the same source a further £9000, with the addition, during each of the three years from June, 1919, to June, 1921, of a minimum annual sum of £6000 on account of royalties. Thereafter, the minimum annual sum to which they would become entitled on account of royalties was £35,000. Originally it had been provided in the agreement between Low-Temperature Carbonization, Ltd., and the British Coalite Company that the payments on account of royalties should begin at the end of the current year for the smaller, and the year 1920 for the larger, sum; but owing to legal delays in the completion of this and other agreements, it was decided to postpone the dates of payment for a year. Commissions and discount showed an addition of £31,113. These commissions were payable under agreements entered into as long ago as 1915. They became due on the issue of the balance of 67,741 ordinary and 11,680 deferred shares of the Company. There was a considerable increase in their holding in the Barnsley Smokeless Fuel Company, which (apart from the 30,000 £1 shares received on the formation of the Company) amounted to nearly £60,000, about one-half of which was in 6 p.ct. mortgage debentures, and the remaining half in 6 p.ct. participating preference shares. The British Coalite Company were now by far the largest holders of debentures in the Company—indeed, they were the only really considerable holders, apart from the Government, who subscribed for, and still holds, £10,000 of the first mortgage debentures. Their £20,000 of the Company's second debentures represented the security the British Coalite Company held for a further advance of £16,000 to the Barnsley Company for additional expenditure on their plant. This expenditure was necessitated by two things—the increased price of materials and labour, and what it would be charitable to describe as the undue optimism of their Consulting Engineer.

As to the Barnsley plant, this, as stated in the report, had continued running during the past year, though not without occasional interruptions; one of the principal difficulties against which the management had had to contend having been the scarcity and inferiority of labour. But with the end of the war, labour would, they might assume, shortly be flowing again in full tide into its accustomed channels. Even with inefficient and uncertain labour, and with the additional handicap of running a plant that was, in many of its aspects, entirely novel, they had proved that they could make a thoroughly good coalite, and obtain a satisfactory yield of other substances. The past year, however, had been very largely one of experiment; and as this was the first plant of the kind to be erected anywhere, it would, no doubt, as the forerunner of cognate plants all over the country—and, indeed, all over the world—while developing an increasing earning capacity, serve a valuable instructional purpose. The Barnsley plant had been visited on several occasions by representatives of the Ministry of Munitions. The main interest of the Government in the process during the past year or so was naturally in connection with its capacity to produce material for explosives. But this need had passed. The four main derivatives obtained by distillation of the crude coal were the coalite, the tar, the gas, and the sulphate of ammonia. Even under the double handicap of inferior labour and of defective material, the quantity and quality of the coalite had left little or nothing to be desired; and that they had not yet succeeded in obtaining the quantity of tar they were aiming at, and knew they could obtain, was, he was informed, solely due to the badness of certain material supplied. But the larger volume was assured, while the quality could hardly be bettered. A big quantity was supplied to the Admiralty, and was very favourably reported upon. Shareholders must not, however, imagine that they were going to be left in undisputed possession of the whole field of low-temperature carbonization, though he thought he might say with absolute confidence that not one of those experimenting in this direction had come within measurable distance of what had been accomplished by the Barnsley Smokeless Fuel Company. So far, indeed, was this from being the case, that it had been reported to him that a Government expert who visited the Barnsley plant some time ago declared quite candidly that it was half-a-century ahead of anything of the kind in existence.

He went on to refer to the proposals of the Fuel Research Board, in connection with experiments on the carbonization of coal at low temperatures, and said he thought they were all entitled to feel surprise that, in a matter of this kind, their Company—the pioneer in low-temperature carbonization, which had achieved results immeasurably ahead of anything that anyone else had done, and virtually controlling a plant actually in being—were not consulted, and given an opportunity of co-operating with the Government in an undertaking of such vast importance. Rightly pursued, there was immense scope for Government action, no less than for individual enterprise. To obtain an adequate supply of cheap power (the great desideratum of industrial economy) under prevailing conditions was manifestly impossible; and one could not doubt that, given an energetic policy on the part of the Government, all the existing concerns would ultimately be swept away or so re-organized that their places would be taken by a tenth of the number of vast generating stations working in conjunction with, and contiguous to, the coal mines and such plants as theirs, where the crude coal would be distilled and converted into a smokeless fuel for domestic and other purposes, into fuel gas to replace the present wasteful burning of coal for steam raising, and into the many bye-products that would enrich the industrial life-blood of the country.

In conclusion, he remarked that at present there were four Companies—Coalite, Ltd., their own Company, the Barnsley Smokeless Fuel Company, and Low-Temperature Carbonization, Ltd.—all tending to the same end; and it had been suggested that greater economy, and at the same time greater strength and efficiency, should result from an amalgamation of all four. The scheme would be considered; but he only referred to it now as a contingency.

After one or two questions had been asked and answered, the report was adopted.

POWER GAS CORPORATION.

Presiding at the eighteenth ordinary general meeting in Manchester, on Monday of last week, of the Power Gas Corporation, Ltd., Mr. E. Lloyd Pease (the Chairman) said the profit for the year was £26,898, as compared with £21,915 for the year ended Sept. 30, 1917. This was the largest profit since the formation of the Company. The authorized share capital was now 300,000 ordinary shares of £1 each, in place of 250,000 shares, and 100,000 deferred shares of 10s. each. An exchange had been effected by which these 100,000 deferred shares had been cancelled and 30,000 ordinary shares substituted. Whereas previously it required £15,000 to pay a 6 p.ct. dividend, it now needed £16,800; but while previously it would have required £26,000 to pay a 7 p.ct. dividend, this could now be done for £19,600. Only 280,000 of the 300,000 shares had been issued. The par value of the 100,000 deferred shares was £50,000; whereas only £30,000 in ordinary shares was given in exchange. This reduction in the liabilities of the Company was balanced by writing off £20,000 from investments in other companies, thus reducing them to their real value. The business of Messrs. Lymn and Rambush had been purchased, payment to be made in 20,000 shares. The acquisition of this business was regarded as a matter of considerable importance. Not only did it secure to the Company the services of both of these gentlemen, and their very wide technical knowledge and experience of all matters relating to producer gas, but it also removed competition. In addition, the Company secured the advantage attaching to patents covering modifications of design in gas apparatus which Messrs. Lymn and Rambush had secured at home and abroad.

There was, he went on to say, a financial matter which did not appear on the balance-sheet, but which was important. During the year, their pre-war standard had been fixed. Owing to the doubt which existed as to whether, for Excess Profits Duty, the Power Gas Corporation and Messrs. Ashmore, Benson, Pease, & Co. were one or two Companies, much work and discussion was involved. It was ultimately decided that for this purpose they were one Company. As this has been finally decided by the authorities, they were left with a standard which represented about 6 p.ct. on the share capital, after which excess profits duty stepped in. As a war measure, and while the Government were the chief buyers of the Company's goods, the duty was obviously necessary; but the view that it should be a standing tax on industry, as was frequently advanced, was a most seriously mistaken one, if he might express his own opinion. During the years 1911, 1912, and 1913, on the results of which the standard was fixed, they were developing their Company, and earning only small profits. They were a pioneer company, engaged in an endeavour to develop an urgently required public necessity—cheap power. How were they to pioneer and risk money in new fields to the general advantage, if 80 p.ct. of any profit they might manage to secure after a moderate rate of interest was mulcted as duty? It must be obvious that advances in the science of power, and in every other science, would be handicapped by such conditions. There was also the ordinary practical side as well as the scientific. To employ labour presupposed the investment of capital in the necessary appliances for this labour. For every £1000 taken from the Company's resources by way of duty, their potential ability to employ two to three further hands was reduced. Of the immediate business prospects, nothing could be said.

The report was adopted, and the dividend recorded therein of 6 p.ct. per annum (less income-tax) was declared.

In a letter to the Sheffield Corporation, Mr. C. K. Baker, of the Chemical and Assay Laboratory, wrote: "It has been frequently suggested that, on receiving notice of a gas test, the Gas Company can temporarily alter the calorific value of the gas supplied to the testing-office. If this were practicable, it would be still easier for the Company to temporarily increase the pressure; and yet the pressure has been below normal in ten out of the last eleven tests."

Two deaths from coal-gas poisoning occurred at Leeds last week. In the case of May Wood, the wife of a soldier in France, it was said she had had influenza, and was found in the bedroom with one end of a gas-tube in her mouth and the other end attached to the bracket. A verdict of "Suicide while of unsound mind" was returned. The other case was an accident; Robt. Ringrose being found dead in bed at his lodgings. It was usual to turn off the gas at the meter; but this had been omitted, and gas had leaked into the room.

LONDON COUNTY COUNCIL AND CALORIFIC POWER AND INERTS.

At the meeting of the London County Council on Tuesday last—Mr. Ronald C. Norman (the Chairman) presiding—the Public Control Committee submitted the report (given in the "JOURNAL" last week, p. 622) calling attention to deficiencies in the illuminating and calorific power of the gas supplied by the Gas Light and Coke, the Commercial, and the South Metropolitan Gas Companies.

Mr. A. L. LEON, J.P., the Chairman of the Public Control Committee, made a statement with regard to the matter, which was still being considered by the Board of Trade. As members knew, the very bad heating power of gas was due to the Government asking the gas companies during the war to provide them with all the benzol and toluol which they could make in order to supply the necessary explosives for use in the war. During the last fortnight he had received a letter from the Ministry of Munitions saying that this was no longer needed. Consequently, they hoped that the low heating power of gas would be improved. Unfortunately, the Committee could not hold out much hope that the gas companies would immediately revert to the pre-war standard which he thought London gas consumers had a right to expect; the reason being that the power of gas was further lowered by an increased proportion of incombustibles, which had not yet been regarded by Parliament as a standard for determining the value of gas. The Committee had not been able to understand why the proportion of incombustibles in the gas of the principal gas companies of London—the Gas Light and Coke Company and the Commercial Gas Company—was very much higher than in that of the other gas companies. They had asked the Board of Trade to withdraw the Order which ruled statutory heating powers, and enable them to use their powers to insist on the companies supplying gas of the statutory calorific standard. In a letter from the Board of Trade, it was stated that the Coal Controller, in view of the coal conditions being likely to continue for some time, wanted no change in the existing method of manufacturing gas which would involve supplementing the aggregate of coal required. It was very important to the consumers of London that the gas companies should be allowed to use more coal in order to provide the standard quality of gas; and it was difficult to understand why some of the companies had not been doing this. He had hoped they would have been able to have arranged before this meeting of the Council that they would agree to raise the value of the heating power of their gas by the amount withdrawn by the extraction of benzol and toluol. He regretted that the great gas companies of London had refused to take this action; and he was afraid that the benzol and toluol, not now required by the Government, was being sold for commercial purposes—perhaps to users of motor-cars, to the harm of the gas, and instead of gas being richer because the Government no longer wanted benzol and toluol, it was, he was informed, by reason of this, very little better than it was before. When the Board of Trade made a further Order under the Order of the Coal Controller, he hoped they would take into consideration the benzol, and not allow it to be sold. The Committee would not be able to bring up a report until after the recess, as the letter which he received yesterday had not yet been before them. In that letter, the Government distinctly declined to say what the proportion of incombustibles should be. In an interview which he had with them, the Committee had agreed upon a certain maximum amount of incombustibles which was necessary to nearly all gas. The Board of Trade did not see their way to say exactly what this maximum should be. After the recess, he trusted they might be able to arrive at some arrangement with the gas companies. Now the Board of Trade held out the hope that, after the months of April and May, it might be possible to get back to a heating power of gas something like the statutory standard which prevailed before the war. If the Coal Controller released sufficient coal for the gas companies, the companies who had hitherto given such very poor gas said they would be able to supply very much better gas. He hoped that would be the case. The people in the south of London, served by the South Metropolitan Gas Company, had received throughout the war, and were now being supplied with, very much better gas than those residing in the northern parts of London. He regretted that the other companies had not been able to do the same. During the recess, they might hear that a sufficient number of miners had come back from France in order to provide sufficient coal.

The report was received.

NELSON AND BRIERFIELD GAS SUPPLY.

End of a Sympathetic Strike.

Representatives of the Nelson Corporation and the Brierfield Urban Council met Sir David Shackleton in London last Wednesday, in connection with the strike of gas-workers in the district of the two authorities. Though no settlement of the dispute was arrived at, it was believed that the negotiations, in which Mr. Will Thorne took part on behalf of the National Union of General Workers, would lead to an early restoration of the gas supply.

The negotiations were carried a stage further on Thursday afternoon, when two of the Union's leaders—Mr. H. Pickard (who was present at the interview in London) and Mr. J. T. Watkins—met the gas-workers at the clubroom. Later they proceeded to the Town Hall to confer with members of the Corporation.

As a result of negotiations which continued practically throughout Thursday, a settlement was effected at night. According to the agreement arrived at, six of the former employees of the Brierfield Council will immediately go back to work, and the remaining three will be found employment by the Nelson Corporation. The discharged soldiers will remain in the employment of the Brierfield Council. In order to restore the gas supply as quickly as possible, the Union representatives agreed to resume work at ten o'clock on Thursday night. The men did so, and the gas supply is now normal.

The Nelson and Brierfield districts have been in darkness for over a week, and much inconvenience has been caused. Polling at the general election took place by candle light, mills could only work in daylight, and Council meetings were held in semi-darkness. The strike, as stated in the "JOURNAL" last week, was a sympathetic one; the gas-workers having come out to support street scavengers on strike in Brierfield.

GAS ACTIVITIES AT CHRISTCHURCH (N.Z.)

A pamphlet entitled "Conveniences of Gas—What the Christchurch Gas Company are Doing," which has reached us from New Zealand, contains an account of an interview of a local Press representative with Mr. Rookwood C. Bishop, the General Manager of the Company.

He was able to say that, though the Company have carried on work for over half-a-century, they have never once failed in the supply of gas to the consumers. All through, the record has been one of sure and steady progress secured by efficiency and ready service. The use of domestic gas-using appliances of all kinds is encouraged in every possible way; a conveniently-arranged demonstration hall, where regular weekly lectures are given, doing excellent work in training housewives and increasing the popularity of the gas-cooker. In addition to this, the lady demonstrator, on request, visits consumers in their own homes, and imparts the best of instruction in cooking and baking in the most economical manner. An imposing building is that which constitutes the Company's head office and show-rooms; and the interior does not belie the promise of the exterior, for there is on view practically everything of the latest design in the way of useful and ornamental gas fittings and apparatus.

PROPOSED GAS LEGISLATION IN VICTORIA.

The Calorific Standard Question.

Views concerning proposed gas legislation were duly placed before the Premier in Melbourne by a deputation representing the Colonial Gas Association, Ltd., who supply gas at Footscray and other places, and the Williamstown Gas Company, Ltd.

Mr. H. A. UNDERWOOD (the Chairman of the Williamstown Company) brought under the Premier's notice a circular in which the Metropolitan Gas Company of Melbourne ask their shareholders to bring pressure to bear upon members of Parliament, in order to secure legislation in accordance with their own views. Such legislation, he said, would involve a denial of justice to the smaller undertakings, and a confiscation of their rights.

Mr. P. C. HOLMES HUNT (the Chairman of the Local Board of the Colonial Gas Association) stated that the Companies represented by the deputation endorsed the proposal of the Government to introduce legislation to establish a calorific standard for gas, to which all suppliers in the metropolitan area would be subject. They could not conceive that the standard proposed would prove any hardship to any undertaking concerned. The demand of the Metropolitan Gas Company for a site for manufacturing purposes at Spotswood was of vital importance to the Companies represented. The Metropolitan Company were expressly prohibited by Act of Parliament from selling or manufacturing gas in the municipal areas of Brighton, Footscray, and Williamstown. The land which the Company now desired to obtain was situated within the municipal area of Williamstown, and it belonged to the Crown. Yet, in the application to the Government by the Company, no reference whatever to the rights and interests of the Williamstown Gas Company or the Footscray undertaking was made; and there was not the slightest suggestion that any consideration whatever should be given to either by the Metropolitan Company or by the Government. The demand made by the Company, therefore, was that the Government should treat as "a scrap of paper" the bargain made, so far as it affected the Williamstown and Footscray undertakings. The deputation desired to enter a most emphatic protest against the protection deliberately given by Parliament to the local undertakings being wiped out for the benefit of the Metropolitan Company. The fact that the Metropolitan Company was a far larger undertaking than these others could not justify such a policy. If the Metropolitan Company were permitted to manufacture gas at Spotswood, the small undertakings would be at the mercy of the larger one in the market for residuals. Speaking in reference to a threatened "gas famine," Mr. Hunt said there were five privately-owned undertakings and one municipal undertaking supplying gas, in addition to the Metropolitan Gas Company. All of these were capable of great development, and were rapidly progressing. But for their existence, a very large portion of the Metropolitan Gas Company's own area would even now, forty years after Parliament had granted the privilege to that Company, be without any gas supply. The Footscray and Williamstown Companies asked for an opportunity for themselves, and for others who were supplying gas within the Metropolitan Gas Company's area, to further develop; and then the danger of a gas famine would be found to be a myth. Rather than endeavour to create a scare respecting the possibilities of a gas famine, it might reasonably be suggested that the Metropolitan Gas Company might adopt the modern methods now almost uniformly practised in Great Britain, and instal plants for the manufacture of water gas. This was a well-recognized method of increasing the output of any gas-works. The necessary plant occupied very little space, and could all be manufactured in Melbourne. The Companies concerned invited the fullest inquiry by Royal Commission or Select Committee.

Mr. C. F. ORR declared that the Metropolitan Company's proposals would mean slow and certain death to the local undertakings.

The PREMIER replied that, before any action was taken, the fullest consideration would be given to the representations made.

TORONTO CONSUMERS' GAS COMPANY.

The seventieth annual report of the Directors of the Consumers' Gas Company of Toronto, which deals with the year ended Sept. 30, records a large increase in the number of customers and in the output of gas.

During the year, 1535 new service connections were made; and as there have been practically no additions to the street-mains system, these services represent new business on existing main pipe-lines. The general shortage of coal and the difficulties experienced by citizens in obtaining sufficient coal for the heating of their houses resulted in large quantities of gas being used for this purpose; while the consumption of gas in munition plants, military establishments, and for general industrial purposes continued to increase.

The Company's manufacturing plant has, therefore, been taxed to nearly the limit of its capacity; but it is gratifying to the Directors that there has been no failure on the part of the Company in meeting these extraordinary demands. Economic conditions have, of course, practically prohibited the installation of new manufacturing plant. As to the increases in the cost of raw materials used in the manufacture of gas, the Directors have thought it well to show the actual rise in certain items of operating costs for the past year as compared with the cost of the same items of 1915.

	Increase.
Gas coal	$499,214.70
Gas oil	265,376.20
Labour	201,914.10
Taxes	69,504.27
Total increase	$1,036,009 27

Having these figures in mind, they say, it is not surprising that the financial statement shows an adverse balance, after payment of interest charges and dividend. The Directors, however, are of opinion that they are justified in allowing the Company to carry a fair share of the burden of the war; and they have therefore refrained from increasing the price of gas to a point which would yield sufficient revenue to cover all of the increase in the cost. It is, of course, recognized that this policy cannot be continued indefinitely; and unless there is early prospect of reductions in the cost of raw material, it will be necessary to further increase the selling price of gas. The Directors have been anxious, however, to demonstrate that they were in earnest in their efforts to maintain the price of gas at the lowest possible figure.

There are 414 names on the Honour Roll of the Company employees who have enlisted for active military service overseas. Of these, 48 have given their lives. The shareholders are asked to confirm the following subscriptions and special allowance made during the year:

Toronto and York County Patriotic Fund	$5,000.00
Navy League of Canada	1,000.00
Payments to wives and families of men enlisted	21,137.00

The following statement for the past, as compared with the preceding year, shows:

	Meters.	Gas Sales.
Year ending Sept. 30, 1918	113,022	$3,811,386.89
" " " 1917	108,719	3,007,423.89
Increase	4,303	$803,963.00

The General Manager's Figures.

In a separate report the General Manager (Mr. Arthur Hewitt) informed the shareholders that the increase in the output of gas for the year amounted to 517,986,000 c.ft., or 12·33 p.ct., notwithstanding the daylight saving regulations which came into force during the year, and the restrictions placed by the Fuel Controller on outdoor lighting. Prior to this year, the maximum gas output for one day had amounted to 13,755,000 c.ft. This figure has been exceeded on several occasions during 1918; the maximum being reached on Feb. 4, when the output for the day amounted to 16,815,000 c.ft., an increase of 22·25 p.ct. over the previous year's maximum.

The accounts show that, after providing for all operating expenses, taxes, &c., the net income falls short of the amount required to meet actual repairs and renewals, interest, and dividends by $120,426.08. As compared with the prices paid in 1915, the past year's prices have advanced for coal 68·2 p.ct., for gas oil 84·5 p.ct., and for labour 46·65 p.ct. The additional cost to the Company represented by the increase of these three items alone has amounted to $966,505.00 during the last fiscal year. The average rate being paid at the present time for labour at the manufacturing plants is 72·36 p.ct. greater than the rate paid in 1915.

Gas was first supplied in Toronto on Dec. 28, 1841; and from careful investigation, it would appear that, while there have been local stoppages due to frost, broken mains &c., there has not been even a momentary interruption to the general gas supply to the city since that date—a period of nearly 77 years.

Reduced Consumption in Glasgow.—Mr. Alexander Wilson, the General Manager of the Glasgow Corporation Gas-Works, estimates there is a reduction of 10 p.ct. in the consumption of gas in Glasgow in one particular week as compared with the corresponding week last year. This reduction represents a daily saving of fully 300 tons of coal. The average quantity of coal converted into gas daily at this season in the past four years has been between 3200 and 3500 tons.

The Reduced Coal Output.—The monthly return issued by the Coal Controller shows that during the first 44 weeks of the year there was a serious falling off in the estimated output of coal compared with the corresponding period of last year. The net deficiency is 17,679,600 tons, or about 8·3 p.ct. For the four weeks ended Nov. 9, it is estimated that 17,762,800 tons of coal were raised at mines in the United Kingdom, as against 18,951,000 tons during the corresponding period of 1917—a deficiency of 1,188,200 tons.

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TRAINING THE MAIMED AND INJURED.

In his Christmas message to the employees, through the pages of the "Co-Partnership Journal," Mr. Charles Carpenter, D.Sc., the Chairman of the South Metropolitan Gas Company, referring to those who have come back maimed or injured by the war, says: In regard to these it is a great satisfaction to know that the spirit of co-partnership has triumphed over a selfish conception of duty put forward as a voice from trade unionism, but which seemed to me quite inconsistent with true fraternal unity. Co-partners who are returning to the Company's service suffering from physical or mental disabilities are being trained to new vocations not less remunerative than those they quitted to take up arms; and all their fellow-workmen are giving hearty co-operation in making the task successful. A pleasant duty will be to help our demobilized men returning to us from all parts of the world to settle down to work under peace conditions. No doubt, the change will prove irksome and strange to many. Perhaps our greatest responsibility will be to give due regard to the altered conditions under which they resume the business of earning their livelihood in civil life. Youths left us to return as men; others whose routine life gave little opportunity of earning distinction have proved their worth—as, for example, the office boy who has attained the rank of Flight-Commander in the Royal Air Force. Both sections of our Co-partnership Committee will be most helpful in such matters.

Nor must we forget how much we owe to the men and women who entered our service to release employees with fighting qualifications. They have taken up strange tasks, pleasant and unpleasant, in daytime and night-time, mostly under conditions of inconvenience and discomfort, with a whole-heartedness deserving the highest praise.

Lastly, but not least, acknowledgment must be made of the loyal and patriotic service of those co-partners left behind, without whose aid we could not have carried on, or fulfilled the special tasks entrusted to us by the Government. Among these latter were the erection or remodelling of four distinct works for the production of chemicals required for explosives or poison gases, on the construction and working of which officers and men alike poured out the full measure of their mental and physical energies. Others gave hearty help to the training of diluted labour. To all acknowledgment must be made of their uncomplaining working with machinery and plant which four years of unavoidable neglect had made, in many instances, tedious, troublesome, and inefficient.

Mallow Gas Undertaking.—The Mallow Urban Council have decided to secure a report from an expert engineer on the general condition of the gas-works.

Dublin Gas Quality.—The Council of the Dublin Chamber of Commerce have resolved to take action in regard to numerous complaints received as to the quality of gas supplied to business and other premises.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 21.

There is little of interest to record in the London market. Pitch is very firm, and tonnage is coming forward for loading more freely than for a long time past. Over 65s. net per ton f.o.b. works is obtainable. Solvent naphtha is rather easy—buyers being scarce at the moment; but no doubt interest in this and other products will increase with the New Year.

Sulphate of ammonia is without change.

Tar Products in the Provinces.

Dec. 21.

The average values for gas-works products during the week were: Gas-works coal tar, 31s. to 36s. Pitch, East Coast, 44s. to 45s. per ton; West Coast—Manchester 35s. to 40s., Liverpool 35s. to 40s., Clyde 35s. to 40s. nominal. Benzol 90 p.ct., North, 1s. 10d. to 1s. 11d.; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 8d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha in bulk, North, 7¾d. to 8¼d. Solvent Naphtha, naked, North, 2s. 10d. to 2s. 11d. Heavy naphtha, North, 2s. 11d. to 3s. Creosote, in bulk, North, 4¼d. to 4½d. Heavy oils, in bulk, North, 5d. Carbolic acid, 60 p.ct. East and West Coasts, 3s. 6d. naked, nominal. Naphthalene, £25 to £30; salts, £6 to £7, bags included. Anthracene, "A" quality, 4d. to 6d. per minimum 40 p.ct.; "B" quality, 1½d. to 2d.

Co-Operation in Engineering and Allied Trades.

In an official statement on the subject, it is remarked that during the period of transition from the manufacture of war material to ordinary trade, some difficulty may be experienced by firms having more orders on their books than they can readily deal with; while there will be other firms having manufacturing facilities without orders to execute. In the national interests, it is essential that firms in these two categories should be brought into intimate touch as rapidly as possible. With this object in view, manufacturers in the engineering and allied trades who need the assistance of sub-contractors, and who meet with difficulty in finding suitable firms to undertake their sub-contracts, are requested to communicate with the Superintendent Engineer of the Ministry of Munitions in the area concerned. Similarly, manufacturers having capacity available, with the necessary labour, should notify the Superintendent Engineer of their area. A list of the Superintendent Engineers and the addresses of the Area Offices is appended to the announcement.

A defective electric circuit is stated to have been the cause of a fire which damaged a room at the residence of the Duchess of Buckingham and Chandos, in Cadogan Square, Chelsea.

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WORKS: Gothic Works, EDMONTON, N. 18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOWROOMS and BRANCHES: 25, PRINCES STREET, OXFORD CIRCUS, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

Labour Shortage at Driffield.—The Driffield Gas Committee are in a difficulty on account of the labour shortage. Though 10s. per shift has been offered for stokers, no applicants of experience have as yet offered themselves. Aged men have had to be rquisitioned to try and cope with the trouble.

Strike Averted at Harrow.—A threatened strike of the employees at the Harrow and Stanmore Gas Company's works has been averted. The men had made demands for increased wages, notwithstanding the agreement entered into with the National Union of General Workers and the National Gas Council, that no revision of wages should take place until February next. By this agreement, an increase of 3s. 6d. per week was paid from the first week in October. The trouble arose through this not having been explained to the men by their Union. The Company held that they could not possibly break the awards and agreement, which affected not only themselves, but many other industries and gas undertakings; and in this they were supported by the National Union of General Workers and the Ministry of Labour. An official from the Union met a committee of the employees at the works last Friday week, and explained the whole position to them. They then stated that they had previously been misinformed, and that they were now willing to abide by the agreement.

Compressed Gas for Motors.—Cylinders of compressed gas for driving motors have been brought into use in Leeds, in place of the unsightly gas-bags which have been the vogue among users of gas for motive purposes. The Leeds Co-Operative Society (who were the pioneers in Leeds in the use of gas for motor driving) have had a 3-ton lorry of 22 H.P. working during the past week, fitted up with the cylinders, eight in number, each containing 125 c.ft. of compressed gas, which will enable the vehicle to run thirty miles as against eight miles with the gas-bag.

Gas Company Publicly Thanked.—At the last meeting of the Dorking Urban District Council, Mr. F. M. Tebbs (the Chairman of the Road Committee) said he thought the Council's thanks were due to the Manager (Mr. J. Urquhart) and the Directors of the Gas Company, for the very prompt measures which they took at short notice to have additional public lamps lighted on the signing of the armistice. He had heard nothing but congratulations upon the exceedingly smart way in which this was done. Mr. E. W. Attlee said he was sure the Directors of the Company and the Manager would greatly appreciate the words of Mr. Tebbs; and as one of the Directors, though taking no part in these negotiations because of his dual position, he should make it his duty to convey to them what had been said.

STOCK MARKET REPORT.

"NOTHING NEW" would fairly well summarize the historical record of the Stock Exchange for the last five-day period. Gradually from day to day business became quieter and quieter, until at length the closing entire week of 1918 passed away into nothingness calmly and peacefully. But markets in general were steady, and showed a store of contained strength that enabled them to present a firm front in spite of their lacking the support of buyers.

The gilt-edged market was in fairly good case. Home Government issues opened in fair demand—War Loans making moderate advances, and Bonds being in marked request. In mid-week there was a pause; but the position was recovered before the close. Home Rails were neglected for some time; but they roused up later on. Canadians and Argentines were subjected to some fluctuation.

In the Foreign Market, French Loans were again the centre of attraction, and were well supported. Among the rest, Swedish and Uruguay were firm; but Chilian, Brazilian, and Mexico were easier. In Miscellaneous, Rubber was rather poor; but Oils were in great strength, and Breweries were very firm.

Business in the Gas Market was on a reduced scale, as was only to be expected at this season, and of the aggregate of transactions by far the greater portion was confined to Gas Light and Coke and Imperial Continental. Notwithstanding the paucity of bargains, the tendency throughout the list was quite firm with only one exception. Actual changes in quotation were few. Commercial debenture was marked *ex div.* at an advance of 1½, South Suburban ordinary rose 1, and Oriental ⅛. Imperial Continental changed hands at easier figures, and the quotation was lowered 1.

Bargains done for cash during the week were as follows: On Monday, European 13¾, Gas Light ordinary 72⅜, 73, 73⅛, ditto preference 70, Imperial Continental 120, 120⅜, 121, 121½, Primitiva 42s. 6d., 43s. 1½d., 43s. 9d., 45s., ditto preference 75s., ditto debenture 75, South African 13¼, South Metropolitan debenture 56⅛, Southampton 68¼, Para 5 p.ct. new debenture 80. On Tuesday, Brentford "B" 71¼, European 13⅞, 13¾, Gas Light ordinary 73, 73⅛, ditto maximum 56¼, Imperial Continental 120⅜, 121, 121½, South Metropolitan 76½. On Wednesday, Alliance and Dublin 52½, Bombay 5⅞, Brentford "A" 80½, ditto "B" 71⅜, 72, Gas Light ordinary 73¼, 73⅛, 73⅜, ditto preference 70, Imperial Continental 120⅜, 121¼, 121½, 121⅜, 122. Primitiva debenture 75⅜, 75½, River Plate debenture 57½, Dartford 5 p.ct. ordinary 82½, 83, Warwick 69½. On Thursday, Alliance and Dublin 53, Brentford debenture 63¼, 63⅜, Gas Light ordinary 73, 73⅛, 73¼, 73⅛, ditto maximum 55½, Imperial Continental 120½, 121, 121⅜, South Metropolitan 76, Southend 5 p.ct. new 67⅝, Eastbourne 5 p.ct. "A" 100. On Friday, Alliance and Dublin 53½, Commercial debenture 53, Gas Light ordinary 73, 73¼, 73⅜, ditto maximum 56¼, 56½, ditto preference 69½, Imperial Continental 121, 121⅜, 122, Primitiva 43s. 1½d., River Plate debenture 58½, South Metropolitan 76, 76½.

In the Money Market, there was much fluctuation. On many days a smart demand arose; but ample supplies came to the rescue, and the pressure was relieved. The Bank rate is 5 p.ct., as fixed on April 5, 1917.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share.	When Div.	Ante-War Dividend & Bonus p.c.	Last Div.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	Mar. 10	4	4%	Aldershot 4 p.c. Pref.	..	55—60	..
1,551,868	,,	April 8	2½	4⅜%	Alliance & Dublin Ord.	69—64	51—56	52½—53½
874,000	,,	July 10	4	4%	Do. 4 p.c. Deb.	76—79	62—67	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6	5¼—6	5⅞
50,000	10	Feb. 26	16	11%	Bournemouth Gas and Water { 10 p.c.	29—30	22—24	..
888,110	10	,,	7	7%	B 7 p.c.	15—15¼	10½—11¾	..
115,000	10	,,	6	6/-	Pref. 6 p.c.	13½—14	9½—9⅞	..
159,740	—	—	—	4%	4 p.c. Deb.	..	66—68	..
992,045	Stk.	Feb. 26	14	4½%	Brentford A Consolid.	261—266	78—81	80½
784,920	,,	,,	11	4½%	Do. B New	204—209	70—73	71½—72
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	77—82	..
221,400	,,	June 11	4	4%	Do. 4 p.c. Deb.	91—98	62—64*	63½—63⅝
317,880	,,	Feb. 26	11	8¼%	Brighton & Hove Orig.	208—218	140—145	..
244,200	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	97—102	..
580,000	20	Mar. 26	12½	22/6	British	44—45	31½—32½	..
120,000	Stk.	June 26	4	4%	Do. 4 p.c. Deb. Stk.	88—90	64—66	..
245,771	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	51—54	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	3⅜—4½	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—6	7½—8½	..
100,000	Stk.	June 26	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	60—66	..
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	79—81	..
1,518,280	,,	Feb. 12	5/9/4	36/-	Commercial 4 p.c. Stk.	106—108	62—67	..
560,000	,,	,,	5¾	30/-	Do. 3½ p.c. do.	103—105	58—63	..
475,000	,,	June 11	8	8%	Do. 3 p.c. Deb. Stk.	69½—71½	51—53*	53
800,000	,,	,,	4	—	Continental Union Ltd.	76—79	50—55	..
200,000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	70—75	..
278,400	—	—	—	10⅓%	Croydon B and C 7 p.c.	..	135—140	..
—	—	—	—	10%	Do. E	..	..	..
492,270	Stk.	—	6	5½%	Derby Con. Stk.	128—125	95—100	..
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	80—88	..
1,002,180	10	July 29	10	5/0	European, Ltd.	17½—18	13—14	13⅜—13⅝
16,998,975	Stk.	Feb. 10	4/17/4	29/4	Gas { 4 p.c. Ord.	98—102	72—74	72½—73⅝
2,600,000	,,	,,	3½	3½%	Light { 3½ p.c. max.	76—79	55—57	55⅛—56½
4,062,285	,,	,,	4	4%	and { 4 p.c. Con. Pref.	96—99	68—70	69½—70
4,674,850	,,	June 11	8	8%	Coke { 3 p.c. Con. Deb.	72½—74½	55—57*	..
180,000	,,	,,	10	10%	10 p.c. Bonds	..	..	..
258,740	,,	Mar. 12	5	2⅝%	Hastings & St. L. 3½ p.c.	87—89	45—50	..
70,000	10	April 29	11	6%	Hongkong & China, Ltd.	15½—16½	7½—8½	..
86,600	—	—	—	9⅛%	Hornsey 7 p.c.	..	117—122	..
181,000	Stk.	Mar. 12	7½	6½%	Ilford A and C.	151—154	92—97	..
66,780	,,	,,	6¾	4⅝%	Do. B	115—118	70—75	..
66,500	,,	June 26	4	4%	Do. 4 p.c. Deb.	92—94	62—65	..
4,940,000	,,	May 14	9	4½%	Imperial Continental	150—160	120—125	120—122
1,285,000	,,	Feb. 12	8½	3½%	Do. 8½ p.c. Deb. Red.	84—86	71—78	..
285,242	,,	Mar. 12	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	93—98	..
2,498,905	,,	Feb. 26	10	5%	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	82—84	..
306,088	,,	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	71—78	..
75,000	5	June 11	6	8%	Malta & Mediterranean	4½—4⅝	3½—3⅝	..
250,000	100	April 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	9½—9⅝	..
1,876,892	Stk.	July 29	4½	3⅛%	Newcastle&Gatsh'd Con.	98½—99½	70—71	..
529,705	,,	June 26	5¼	5¼%	Do. 3½ p.c. Deb.	82—88	59—61	..
55,240	10	Feb. 26	7/14/0	7½	North Middlesex 7 p.c.	14—15	9¼—10½	..
500,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—73	4—5	..
60,000	50	Feb. 26	18	9%	Portsea, Island B	128—131	78—88	..
100,000	50	,,	12	8%	Do. C	118—121	73—78	..
52,000	50	,,	10	6%	Do. D	..	..	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	2½—2⅝	42/6—45/-
499,960	5	June 26	5	2/6	Do. 5 p.c. Pref.	4⅝—5	3⅝—3¾	75/-
521,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—93	74—76	75/-
—	—	—	—	4%	Do. ,, ,, 1911	..	52—57	..
346,198	Stk.	June 26	4	4%	River Plate 4 p.c. Deb.	85—87	55—60	57½—58½
150,000	10	May 14	6	6/	San Paulo { 6 p.c. Pref.	10¾—11	7¼—8	..
125,000	50	July 1	5	5%	5 p.c. Deb.	47—49	40—42	..
185,000	Stk.	Mar. 12	10	10%	Sheffield A	238—234	170—173	..
209,984	,,	,,	10	10%	Do. B	229—224	170—173	..
533,500	,,	,,	10	10%	Do. C	230—222	168—172	..
90,000	10	May 28	9	6/-	South African	10½—11½	13—14	13½
6,609,896	Stk.	Feb. 10	5/4/0	32/-	South Met. 4 p.c. Cons.	111—116	76—78	76—76½
250,000	,,	July 12	—	5%	Do. Pref.	..	91—93	..
1,696,445	,,	July 10	8	8%	Do. 3 p.c. Deb.	73½—74½	55—57	56½
224,820	,,	Feb. 26	8½	6%	South Shields Con. Stk.	157—159	114—116	..
262,795	,,	,,	6	3½%	S'th Suburb'n Ord. 5 p.c.	114—116	76—78	..
60,000	,,	,,	5	5%	Do. 5 p.c. Pref.	110—112	75—78	..
185,000	—	—	—	3½%	Do. West Kent	..	..	..
197,558	Stk.	June 26	5	5%	Do. 5 p.c. Deb. Stk.	116—118	85—87	..
647,740	,,	May 14	6	3%	Southampton Ord.	99—102	67—70	68½
120,000	,,	Feb. 12	7½	5⅝%	Tottenham { A 5 p.c.	135—138	95—	..
789,275	,,	,,	6	4%	District { B 3½ p.c.	115—117	67—69	..
181,255	,,	June 26	4	4%	4 p.c. Deb.	87—89	61—63*	..
189,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
236,476	Stk.	Mar. 12	5	5%	Tynemouth 5 p.c. max.	103½—109½	87—88	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	Feb. 26	8⅜	63/9	Wandsworth A 5 p.c.	151—156	90—95	..
255,636	,,	,,	6⅞	48/9	Do. B 3½ p.c.	129—134	70—75	..
108,075	,,	,,	5/17/8	44/7½	Do. C 3½ p.c.	110—115	70—75	..
852,000	,,	,,	6⅜	42/6	Wimbledon 5 p.c.	117—122	70—75	..
98,000	,,	,,	6⅜	48/9	Epsom 5 p.c.	121—126	72—77	..
88,416	,,	June 26	3	3%	3 p.c. Deb. Stk.	66—69	49—52	..

Ex div.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 18.]

Nos. 20,386—20,906.

ASHWORTH, A. A.—"Apparatus for distilling or cracking heavy oils, &c." No. 20,531.
BREEDEN, F., AND BREEDEN & CO., J.—"Incandescent gas-burners. No. 20,701.
BRUNNSCHWEILER, K. A.—"Gas-stoves and fireplaces." No. 20,679.
CLIMIE, W.—"Gas-producers." "Gas-producing plant." Nos. 20,390, 20,391, 20,392.
DAVIS, H. N.—"Reversible regenerative gas-fired furnaces." No. 20,456.
DEMPSTER, R. & J.—"Gas-diverting valve of rotating type for purifiers, &c." No. 20,423.
DICKINSON, C. P.—See Ashworth. No. 20,531.
EMBREE, H.—"Machines for sewing incandescent mantles." No. 20,529.
GLOVER, T.—"Construction of coin carrier for coin-freed mechanism." No. 20,717.
GLOVER, T.—"Coin-freed mechanism." Nos. 20,718, 20,719, 20,720, 20,721.
HUTCHIN, R. F.—"Gas-heaters." No. 20,758.
IVERSEN, H. M.—"Gas-producers." No. 20,654.
LEES, W.—See Climie. Nos. 20,390, 20,391, 20,392.
O'BRIEN, A. M.—"Continuous fractional distillation." No. 20,765.
PACE, P. C.—"Manufacture of air gas." No. 20,779.
PRENTICE, J.—"Retorts and stills." No. 20,447.
RODGER, W. F.—See Dempster. No. 20,423.
SMITH, D. J.—"Gas-producers." No. 20,436.
SMITH, W. S.—"Pressure-reducing valves." No. 20,462.
TEMPLE, H. E.—"Means for gasification of coal, shale, &c." No. 20,880.
TWIGG, W. R.—See Davis. No. 20,456.

Falkirk Gas-Works Strike.—A strike at the Falkirk Gas-Works has been settled, though the town was in darkness at night until an arrangement was come to. The demand of the strikers for payment as from Jan. 11 last, instead of from Jan. 25, of an advance in wages granted nearly a year ago by the Town Council, was conceded under protest. Even after the Council had made this concession, the men declined to resume work; a new demand for payment as from Dec. 12 last year being put forward. Afterwards, however, they accepted Jan. 11 as the date.

Stanton Iron-Works Company.

The Stanton Iron-Works Company, Ltd., near Nottingham, have entered into a working arrangement with Messrs. James Oakes & Co., of Alfreton Iron-Works, Derbyshire, under which the Stanton Company will from Jan. 1 act as Sole Selling Agents for the products of Messrs. James Oakes & Co.'s blast-furnaces and foundries. The Stanton Company have in the past had the largest output of cast-iron pipes of any foundry in Great Britain; and their recent amalgamation with the Holwell Iron Company, Ltd., of Melton Mowbray, has given them a predominating position in the cast-iron pipe trade in this country. Messrs. James Oakes & Co.'s foundries have been devoted largely to the manufacture of flange pipes and special castings of every description, for chemical and coke-oven plants and for circulating, cooling, boiler, and electric power plants. It will be gathered from this that the recent combination places the Stanton Company in a leading position in the cast-iron pipe and general foundry business of the world.

Tralee Gas Undertaking.—The results of the present quarter's working of the Tralee Gas-Works are expected to make up in large measure for a loss of £1900 sustained on last year's working, due to coal shortage difficulties. The price of gas is to be increased from Jan. 1.

Increased Price at Bradford.—The price of gas in Bradford for all purposes is to be increased 8d. per 1000 c.ft. as from Jan. 1. The charge will then be 4s., as against 2s. 1d. in pre-war days. The reason for the advance is the high cost of coal and the increased wages which the war has brought about.

Gas Light and Coke Company and Financial Relief.—Referring to the application by the Gas Light and Coke Company under the Statutory Undertakings (Temporary Increase of Charges) Act, Mr. D. Milne Watson (the Managing-Director) has pointed out that, even with the relief which the Act offers, it must be borne in mind that the dividend will only be 3 p.ct., as compared with £4 17s. 4d. p.ct. which was being paid at the outbreak of the war. The application made by the Company will not involve the raising of the price of gas. In their application, the Company, referring to their 3½ p.ct. stock, ask for power to continue to pay either the full dividend on this so long as the price charged for gas does not exceed 3s. 11d. per 1000 c.ft., irrespective of the dividend paid on the ordinary stock, or at the rate of £2 12s. 6d. p.ct. (being three-fourths of the maximum rate of dividend), whichever of these rates shall be the higher. Reporting on the matter, the General Purposes Committee of the St. Pancras Borough Council state that the circumstances do not justify the modifications of the provisions for which the application is made; and they have therefore directed the Town Clerk to protest against the proposals of the Company.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND GENERAL MANAGER, South Shields Gas Company. Applications by Jan. 4.
MANAGER (Coke Ovens, &c.). Bearpark Coal and Coke Company, Middlesbrough.
ACCOUNTANT (India). "India," c/o Streets, Cornhill, E.C.
FOREMAN (Maintenance of Offices). No. 6546.
FOREMAN (Geyser Manufacture). Parkinson Stove Company, Stechford.
FOREMAN FITTER. Redcar Gas-Works.
WORKS FOREMAN. Walsall Gas Department. Applications by Dec. 31.
BRASSFINISHERS. No. 6555.

Appointments, &c., Vacant (*Continued*).

DRAUGHTSMAN. No. 6560.
WORKS FITTERS. No. 6559.
GAS FITTER. Glastonbury Gas-Works.
GAS FITTER. No. 6554.
F.A. MACHINE DRIVERS AND LID MEN. No. 6558.

Appointments, &c., Wanted.

ADVANCEMENT (Commissioned Officer R.E.) No. 6561,
COKE OVEN AND BYE-PRODUCTS WORKS MANAGER. No. 6550.
DISTRICT INSPECTOR. No. 6548.
ENGINEER AND MANAGER. No. 6532.
ENGINEER OR GENERAL MANAGER (Large Gas-Works). No. 6557.
REPRESENTATIONS, Compagnie Générale de Constructions Gazières, 335, Rue Basse-Wez, Liege.

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